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FARMERS DIGEST

AUGUST–SEPTEMBER, 1942

Volume 6
Number 4

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The Farmer's Digest

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With the exception of this issue, the FARMERS DIGEST will continue to be published monthly.

The Farmer's Digest

Volume 6 August–September, 1942 Number 4

A Piece of Land

Condensed from The Land

Louis Bromfield

I CAN recall the exact moment when I became interested in conservation. It was on my grandfather's farm in Ohio. I was six years old. I looked at part of a field where the corn was short, and yellow. That meant the soil wasn't good, and I felt a pain, an injured feeling. Ever since then, when I look at a poor spot in a field I have experienced the same curious emotion of pain and starvation. When I came back to Ohio I wanted the kind of farm that was sick and needed help. I wanted to do something about it. Any one with a feeling for the land will know what I mean.

A great many farmers in America have this feeling, but not enough of them have it. Too many American farmers are not really farmers. They are land speculators. In the past they would strip one farm then move on to another, strip it, and keep moving on west.

We are faced with the fact that those days are over. For the first time in our history we are being forced to approach a situation which people in Europe and the rest of the world have been forced to face for several thousand years. We have had every advantage. We have the experience behind us. We have seen what has happened here and in other countries.

I come from a family of farmers. It was in my blood. My whole life has been a struggle with a dividing personality. I wanted to be a farmer in the beginning, but my father disagreed. He wanted me to be a writer and make enough money to be a farmer on my own terms. I followed his advice. That is how I came to be a writer and how I came to live out of America for over fifteen years.

I had a place in France—a small farm. About seventeen years ago I tried to buy this

small French farm. It belonged to three aged French women who lived in a provincial town. They had been to Paris but two or three times in their lives, although they lived only 30 miles away. I offered them three times what the place was worth because I wanted it and could afford it.

They would not sell. I said to the oldest of them, "Why don't you sell?" She replied, "I could sell it to you. I could take ten times what it is worth, but what would I put the money into? How would I know that that money was going to be safe? I'll rent it to you instead. Then no matter what happens I'll still have my land." She had been through the war of 1870 and through the 19th century wars; she had been through the inflations and deflations of France. She was absolutely right. If she had taken ten times what her land was worth she would be penniless today. Today she still has her land. That was one of the things I learned outside America.

The first place I always visited in any country in which I happened to be traveling was the agricultural station. I did this in India, Africa, Sweden, Germany, France—everywhere. I wanted to see what was being done with the earth. I saw the plains of China, gone beyond the stage of reclamation to the point where they are hopeless. And I saw that the prosperity and civilization of any country I visited depended upon the condition of the soil. I learned that the economy, the culture and civilization of any country is entirely dependent on the condition of the land.

Living in France, I saw a country survive through times that would have been disastrous to many other nations. The reason France survived was that she had a fertile country; she was the only country outside of Russia that could feed herself and still export food. Even today France raises from 10 to 20 bushels of wheat per acre more than the best land in America will raise. That is because the French love the land and have cherished it for a thousand years.

We came back to America, my wife, my children and I. We came to Ohio. I had been here only one night in twenty years. I had forgotten what a beautiful state it is. The day after I got off the boat from Europe I selected the farm I have today. It was a poor, run-down farm in the hills of Richland County. I could have bought the best farm in the Black Swamp Region, but I would have been bored to death with it, and I knew it. I wanted a place where I could do something for the poor hills which had been treated badly and were in need of help.

I bought three farms, one a top farm, one half way down the valley and one a valley farm in picturesque and properly named Pleasant Valley. I knew this country. I had hunted and fished there as a boy.

We are accustomed to hearing of the heroism of the early pioneers. In facing hardships, they were heroic. In other respects they were not so. Their greed and carelessness were terrific, but nothing compared to the greed and carelessness of their sons and grandsons. Many of our parents and grandparents ruined and destroyed the lands of Ohio.

My three farms were typical. They had been skimmed and scraped and starved and beaten when we came along. What has been done for these farms, I have been only a little part responsible for. I could not possibly have done it myself. A great part of the job has been done by my partner, a man who is one of the new kind of farmers. He is one of the most valuable citizens of Ohio or the Nation, because he really loves the land. His name is Max Drake. The nation owes men like him a very great debt.

The rest of my story is simply what has happened on this farm, what a little care will do, and how nature responds to a little kindness. Until we started work we lost 60 or 70 per cent of the rain which fell. It ran down into the streams and out to the Gulf of Mexico instead of staying here in the State of Ohio. It carried with it pounds and sometimes tons of top soil. Nothing was done to prevent it. There were periods when certain fields of this farm were dry; they burned out because none of the water remained there. There were springs which had withered up; one or two gave very little flow any longer.

We went to work on that farm. We had every possible problem of erosion. I must say that was what I wanted, and that was what Max Drake was interested in. We started to put this land back into the condition which God had left it before it had been pilfered by the people. In doing that we had invaluable aid from the state government, Wooster Experimental Station, the University, the Extension School and Federal men.They came in eager, glad, to see us putting back a piece of land which once had been one of the fertile spots of Ohio.

One of the first things we did was to turn parts of the land back into pasture. On the top fields we planted cover crops. We never have a vacant field. There is no bare spot on our land winter or summer. We have no old-fashioned corn fields, bare in winter. Such fields have a winter cover crop of wheat.

Some of our fields had ugly gullies, but we are now growing good corn across those gullies, and they are not gullies now. We put a great terrace ditch around the hillside—a ditch 12 or 15 feet across and 3 feet deep. Now, instead of the ground being covered with flood water which the farmers before us contended could not be stopped, the water stays on top of the hill. It fills the terrace ditch and then seeps through the sod. After a violent rain the ditch is filled with water which stays in the ditch. Below, the water does not rush across the fields and no gullies are cut in the good earth. The important thing is that water remains on the place now and slowly seeps down through the hills.

Almost at once we began to discover very interesting facts. It is marvelous the quickness with which nature responds. We brought forth seepage springs where there had been no water before. We created a number of springs in the back yard which we cannot get rid of.

Just in front of the house there remains the foundation of an original log cabin of the pioneer era.The cabin had been built over a spring. The settlers chose the best spring and built their cabin so they didn't have to go outside the house for water when they were being attacked by Indians. When we came there the spring was a mud puddle. We wondered why the settler had built his cabin there when in the middle of August the spring went dry. In the second year of our operation we began to understand why. When the settler had built his home there had been a fine flowing spring. When the forests were cut and the land stripped, it had dried up to a mud puddle. Then we came along with our experiments and this summer the spring is full of crystal clear water. It throws a stream approximately two inches in diameter at this dry time of the year.

I mention these things to prove what can be done for the land. We have on our 700-acres not a square field or, if we can help it, not a clean fence row. Our furrows follow the contour of the hills, and the terrace ditches do too. None of the rain can wash away to make a rill or a rivulet. The rain that falls is always caught and held by the sod or the cover crop in between.

Our land is on the top of one of Ohio's watersheds. There is nothing above us but sky. What happens on our farm, we cannot credit to what somebody else does in the valley or above us. We sit against the skyline. Whatever results we get we can judge absolutely as laboratory experiment.

We are keeping the cattle out of the woods and letting the

forests go back to what they were in the early days of Ohio. We are creating again the kind of land which once existed here, and there is satisfaction in that. My travel, my experience—nothing I have ever done has given me nearly as much satisfaction as this bit of land and what we have been able to do with it.

Because we kept water on the place our neighbors see us growing 30 or 40 per cent more crops than an old-fashioned farmer. They can see our clover fields growing rugged crops of hay because the rain which fell early in March is still in our soil instead of in the Gulf of Mexico. When they look across the fence they are convinced, they can see the improvement; and they come from all around to see what is going on and what we are doing. We are not only being able to do a little good that way, but we are doing a little good for Ohio in general, if we just keep after those 700-acres and keep that water there.

Rushing water is making a lot of trouble in Ohio. It is making a lot of trouble for cities, factories and a vast difference in the economic future of the State. Dams will not make any more water in the streams. We shall still have the same floods and dry spells. The thing has to begin back on hills which should be forested again and on hills which should be plowed on the contour. The hills—that is where the water comes from. It is our job to conserve the water in the hills. It is not entirely a farmers' problem; it is up to citizens of every kind. It affects every possible kind of citizen—the fisherman, the hunter, the banker, the industrial man, the farmer—every possible person. The future of America is bound up in water and soil conservation.

Good land is the foundation of every country, the foundation of not only its economic prosperity but of its civilization. Americans face a job in these days which is far more important and more heroic than the job of the early pioneers. It is for each one of us to do his part, for each one of us is dependent upon the good earth in the end.

Revolving Paint Mixer

"Here is the most efficient paint mixer I have used," said Fletcher Copes, picking up a small shaft with propeller-shaped fins at one end. He took down a breast drill and fitted one end of the mixer shaft into it, and began turning the crank. The mixer set at the center of a paint container, starts a flow of paint that is upward at the center of the pail; downward at the outside. Neighbors of Copes in Wapello county, Iowa, borrow the device when they have a painting job to do.

—*Capper's Farmer*

New Red Clovers

Two new red clovers are being recommended to Illinois farmers by J. C. Hackleman, Illinois Agricultural College. Midland is hardy, productive and resistant to northern types of anthracnose. Tests in other states indicate it is widely adapted to Corn Belt territory.

Cumberland, which has high resistance to the southern type of anthracnose, is adapted to the southern portions of Missouri, Illinois, Indiana and Ohio, and most of Kentucky, Tennessee and Virginia.

—*Capper's Farmer*

Cooperative Selling

Condensed from Country Life

Jack Widmer

IT doesn't matter what you raise — horses, cattle, hound dogs or spotted hogs — you have to dispose of your produce or you'll soon be stumbling your way around the farm over the delightful compounded increases that nature has so abundantly provided. Yet this selling of livestock, no matter what class, is not simple—and it is doubly difficult for horsemen.

Any traveler can immediately determine when he is approaching a horse-producing area, for there is at once audible a plaintive wail of despair.

Should he pause to listen, he will hear something like this: "You can raise good horses, you can even raise a winner, but how are you going to sell him?"

This is usually accompanied by a second chorus that proclaims the horse business no business, that it's a toy of the idle rich, that the average man is foolish if he tries to buck the tide, that you can't sell horses at a profit.

To all this we offer a resounding "bird," and for proof we invite you to hear the tale of the Colorado Springs Thorobred Horse Breeders' Association, who are as successful in cooperative selling as their name is long.

Here is a group of seven equine nursery operators who apparently haven't the intelligence to realize that horses are a drug on the market.

Instead, they merely go on their ignorant way, sell over fifty horses a year at their annual sale, and manage to obtain an excellent price, considering that they are producing western-bred horses in a locality where feed and taxes are cheap, and where they don't need a thousand-dollar average to break even.

To cap the whole business, they spend an entire week together (along with their horses) on the grounds of the Broadmoor Hotel in Colorado Springs, Colorado, and have a rollicking seven days of polo, horse shows, and general good fellowship, climaxed with the sale itself.

Inasmuch as the principles of cooperative selling are much the same no matter what the breed or class of livestock, anyone in

Reprinted by permission from Country Life, February, 1942, 1270 Sixth Ave., New York City

any purebred game should be interested in what this organization is doing, for we feel that cooperative selling is the answer to many purebred marketing problems, and that this group of horse producers has worked out many of the more intricate angles of a slightly complicated solution of an even more complicated problem.

The success of this organization has not been one of chance; instead, it is the result of much intelligent planning and a great deal of hard work.

To begin with, the membership was hand-picked, only those admitted that were known to be reputable producers of better than average Thoroughbreds, and who had that all-important quality, a sense of humor.

They were selected because they knew the meaning of the word, "cooperation," had no time for bickering or petty quarreling and above all, were sportsmen who were willing to sell some of their better horses at a reasonable figure (so that the organization could start off with a "bang-up" sale) and to be good enough sportsmen to take a beating if need be for the first few years of the experiment.

To insure that only animals of quality would be sold, the membership made a "round-robin" trip to all the members' farms and closely inspected all horses that were to be offered. Friendships were forgotten, with the result that a few inferior horses were refused admission to the catalog and consequently all fifty-four head sold in 1941 were of good quality.

The bidder thus knew that not only was he bidding on animals of quality, but that the animal was guaranteed not only by the member who consigned him, but by the entire organization.

Having been on the purchasing end of public sales themselves, the members knew that many people would be interested in purchasing a horse, yet because of lack of experience in judging unsoundness, might be wary of purchasing at public auction. To overcome this, a factor was incorporated that was perhaps the most important reason for their success — the veterinary's certificate.

Each animal entered in the sale was minutely inspected by a competent veterinary, and a certificate pointing out all defects (including the most minor blemishes) was kept in the sale office during the week previous to the sale, and read over the public address system before the animal was knocked down. This seemed to give much confidence to the buyers, for bidding was brisk and there was not one complaint following the sale.

Inasmuch as none of the mem-

bers had had any too much experience with the costs of operating a sale or in staging such an event, a tentative budget which seemed to be practical was worked out.

First, it was assumed that the 54 head cataloged would bring an estimated $15,000, and the membership therefore decided to charge themselves a 10% commission on the following basis:

Commission of 10% on $15,000, $1,500. Expenses:

Auctioneer	$200
Printing and distributing of 1,500 catalogs	200
Advertising in national magazines and local newspapers	500
Preparation of grounds	100
Preparation of bidders (buffet supper previous to the sale for all and sundry)	200
Rental of public address system	20
Clerical help, postage, etc.	50
Veterinary's fees for examination and certificate	50
Total expenditures	$1,320

Of course these figures could be expanded or contracted, depending on the state of minds and pocketbooks of the association members, yet even at a 10% commission it will be seen that after all expenses had been deducted there was a balance of approximately $200. As a matter of fact, the sale grossed over $15,000 and with 54 head sold, the cost of selling per head was less than $25—a reasonably low figure for any auction.

Let's take a closer look at this budget. The item, "auctioneer's fees," will depend largely on locality (the distance the auctioneer has to travel to the sale) as well as the type of man desired. The cost of printing of catalogs could have been reduced by half had the association members not been of the opinion that the distant prospective buyers might be influenced by their quality.

Concerning the hundred dollars for the preparation of grounds, the leasing of bleachers, etc., this, too, could have been reduced, yet this organization felt that it paid to have the prospective purchaser as comfortable as possible.

As to veterinary fees, the membership thought this expense very well worthwhile; the $200 item for the supper party comes under the heading of "good will" and good clean fun; and good will at $200 is cheap indeed.

The $500 spent for advertising could easily have been increased, for it brought a strong return on the money. Yet advertising (like anything else) must be handled intelligently, for promiscuously placed advertising is of little value. Publications must be studied carefully, their circulations checked against their space rates and care being taken that the "right" people are reached.

Approaching this problem, and realizing that they were operating on a limited budget, but two sportsmen's magazines of national circulation were selected, the remainder of the money divided among small publications that served the horse localities of various regions.

What information should these advertisements contain, and what are the results of such a campaign? In content, the amount of copy will of course be affected by the space to be purchased; however, a good rule might be to under- rather than over-write, to have as much white space around the advertisement as possible.

Time, place, what is offered, by whom and under what conditions, are the important items; yet perhaps the most consequential part of this is the line that invites correspondence, *i.e.*, "For a complete catalog of all animals listed, please communicate with ——— at ———."

As to results, the effect of an advertising campaign can be reasonably accurately measured by the number of requests in answer to various advertisements. Should an association be interested in knowing what publications are doing them the most good, they may give each magazine or newspaper a code letter, *i.e.*, "For a complete catalog of all animals listed please communicate with ——— at ———, Department A." "Department A" will of course be the code letter for one magazine, "Department B" for a second, and so on.

But what do these requests for catalog signify? What are they worth in actual dollars and cents? The answers to these questions were (to this association at least) quite startling: 487 requests for catalog were received for the $500 expenditure, and 196 persons making these requests actually were in the audience; 20 head were sold to these persons for a total of $9,400, more than half of the total monies taken in.

The returns from each magazine and newspaper were as follows:

Magazine	No. of requests for catalog	No. of bidders present	Cash return in gross sales
A	195	53	$3,505
B	63	14	1,100
C	47	19	700
D	39	4	630
E	83	74	1,700
F	49	31	1,765
G	11	1	
Total	487	196	$9,400

It is, of course, impossible to know how many of the animals listed above would have sold without this advertising and at what price, nor is there any way of knowing how many of the above listed bidders would have made an appearance; yet it is

an established fact that 196 live bidders were obtained from this $500 advertisement investment and left a total of $9,400 behind them.

We were also interested in the figures concerning the number of requests in relationship to the number of persons that actually appeared at the sale (after having requested catalogs), for we had been unable to obtain average figures from any text book on advertising.

At this particular event 196 persons actually appeared out of a total of 487 that had applied for catalogs. No doubt many of the original requests were the handiwork of letter-writers who write for anything and everything; yet the figure of 40% actually coming to the sale was both interesting and, to the association, surprisingly high.

It is also interesting to note that, but with few exceptions, the higher-priced horses were purchased by the group who had come to the sale as a direct reponse to the advertising campaign.

In the actual mechanics of the sale the Colorado association has done an admirable job. They hold their sale at the peak of the Colorado Springs summer season, the evening following the afternoon performance of the Colorado Springs Horse and Colt Show, in which most of the sale lots have been shown, giving the prospective purchaser the opportunity to see the horses that are to be included in the sale in direct competition with other horses of their class.

As to the conduct of the sale, everything is done to hurry matters along, to be sure that there is little delay between horses and that the crowd is kept awake by the mixing up of the ages offered. The association has made it a practice to sprinkle the very top consignments throughout the auction, drawing lots for the balance. In this system the audience has no way of knowing which horse is coming up next, and if anyone is interested in bidding on any certain animal he must stay awake throughout the sale.

Through intelligent handling, this small organization has developed a steady market for their produce. By discriminate selection of horses they have maintained a high standard of quality, and by the use of the veterinary certificate have been able to develop a feeling of confidence in the buying public. In return, bidders from many states have been attracted to this annual event; realizing that they are to be treated fairly, they bid briskly, and have made this sale an outstanding success.

Cooperative selling seems to be the answer to the pure-bred breeder's prayers. In comparison to private sales (many breeders

are trying this method of disposition of their increase), expenses through joint sales can certainly be reduced, larger crowds can be attracted due to the larger numbers being put under the hammer at one time and, if the proper people are included in the organization, there is a great deal of sport to be had from such an event.

Combination Legumes for Cows

Condensed from Kansas Farmer

A new kind of combination has appeared on the scene for cattle. Harry Schrader and sons, Kansas stockmen, have tried the plan of providing a combination legume pasture for their animals.

To make this combination they have seeded sweet clover and lespedeza together on the same land, after wheat harvest. One year, 23 acres seeded in this manner provided pasture for 81 head of steers from midsummer until frost that fall.

The second season for this combination pasture brought another heavy supply of feed.

The two crops have proved to be excellent co-operators in providing pasture at different months. Sweet clover makes early summer pasture, and at about the time it passes its peak carrying capacity the lespedeza is ready to provide good feed. The lespedeza can be pastured until frosts kill it.

Schraders have followed the same plan with equal success by planting after oats.

The plan offers some flexibility in the farming system because, if pasture is abundant, the sweet clover crop may be utilized as seed. It is even possible to take a seed crop from the lespedeza, but this is not highly satisfactory because of the difficulty of combining lespedeza in the clover stubble.

Looking at it from all angles, the clover-lespedeza combination has a number of strong advantages. In the first place, it provides an abundance of pasture thruout the summer and fall; it provides for full utilization of ground; it helps insure a safe feed supply; it offers flexibility of farm operation; and with all these it is good for the soil.

Birth Control in the Cow Barn

Condensed from American Dairyman

Leland W. Lamb

NOWHERE on earth is birth control more important than in the cow barn.

The man who expects to make his living milking cows must control not only the parentage of his calves, but the frequency with which his cows produce calves. And most important of all—when these calves shall be born.

The Bureau of Dairy Industry at Washington, through the extension service in the various states, is engaged in a gigantic sire-proving campaign. The object of this sire-proving program is to provide farmers with bulls that transmit high production to their daughters. If this can be done, much of the present day gamble will be eliminated from the breeding of dairy cattle.

The whole sire-proving program is based upon a standard basis of evaluating the producing capacity of our dairy cows. These cows are tested in the dairy herd improvement associations sponsored jointly by the Federal and State Agricultural Extension Service.

At the suggestion of the American Dairy Science Association the Bureau of Dairy Industry uses the 305 day twice daily milking (2x) mature equivalent for each and every cow whose record is reported to the Bureau by the dairy herd improvement association testers. If a cow has completed more than one record the average of the mature equivalents of all her records is used to denote her producing ability.

When the American Dairy Cattle Club, an open registry association entered the field, it adopted the same 305 day 2x mature equivalent as its basis for designating the production of all cows whose records are reported to and by the Club.

Mature equivalents have been adopted as the most accurate method of comparing the producing abilities of different cows. By this method, records made by cows of different ages can be compared directly without the complicated process of mental calisthenics necessary under any other system of comparison. It is by this method that the producing ability of all cows tested in the dairy herd improvement associations and with the American Dairy Cattle Club is evaluated. It is by the same system, there-

Reprinted by permission from the American Dairyman, Feb., 1942, published by the American Dairy Cattle Club, 33 N. La Salle St., Chicago, Illinois

fore, that the transmitting ability of all sires proved by these records is ascertained.

It is exceedingly important that these mature equivalents be accurate. They must reflect as closely as possible the actual annual production of the cows for which they are computed. Otherwise they may be very misleading.

Thus it becomes important that each cow be milked not more than nor less than 305 days. Three hundred and five day lactation records can best be secured when cows are bred to calve at approximately twelve month intervals. This is because of the necessity of a six, and preferably eight weeks' dry period.

To calve at 12 month intervals a cow must be bred approximately eighty days after calving —80 days open plus 283 days to carry her calf equals a full year.

In this manner every careful dairyman will watch the breeding dates of his cows and thus control the birth of their calves. He will breed each cow the first time she comes in heat within 21 days of her last year's breeding date. Example: a certain cow was bred January 28, 1941. She calved November 6, 1941. She should be bred again the first time she comes in heat *after* January 7, 1942.

It is only by such a system of birth control of calves that cows' 305 day records will approximate their annual production.

To be profitable, a cow must produce at full capacity year after year for several years.

Nature has decreed that full production can only come from a normal cow following the birth of a calf. Consequently, to produce at full capacity every year, a cow must have a calf every year.

We know full well that practically every cow reaches her highest daily production in from two to ten weeks after her calf is born. Furthermore, we know that following this peak, her daily productions begins to decline until finally depending on her persistency, she either "goes dry," is "turned dry" or is "dried off."

We all want cows with high "peaks" of production. We want them to maintain that peak for as long as possible. We want them to be persistent—to milk well right up to the time they should be "dried off." None of us want cows that "go dry" in spite of all we can do to keep them milking. We want the kind that must be "dried off."

If we have studied our cows we know that a cow cannot and will not reach the highest daily milk production of which she is capable unless her freshening has been preceded by a good dry period—at least six, and preferably eight weeks.

It is necessary, therefore, if we want our cows' records to show their actual producing capacity, that we manage our cows from the standpoint of the following *essentials to continued high production:*

1. A calf every year—more specifically every twelve months.
2. A dry period each year of from six to eight weeks.

To control the birth dates of your calves in this way, birth control in the cow barn—will enable your cow to complete a 305 day record, receive the benefits of an eight week dry period and be in condition for maximum production the following year. Below is calving and production record of a cow which conformed very closely to the recommendations of this article.

Calving	Date	Mature Equivalent M.	B.F.
1st	Aug. 31, 1932	8387	471
2nd	Sept. 11, 1933	8976	483
3rd	Oct. 10, 1934	8494	450
4th	Oct. 1, 1935	9605	498
5th	Oct. 12, 1936	9734	501
6th	Oct. 13, 1938	9787	483
7th	Oct. 6, 1938	10066	487
8th	Oct. 17, 1939	9837	529
	Average	9360	488

At least in the northern part of the United States it is to a cow's distinct advantage from the standpoint of both maximum production and maximum profit from her milk, for her to freshen between August 15 and December 1.

Studies of New York D. H. I. A. cows show that cows freshening in November produce the most milk and that cows freshening earlier in the Fall produce the most income over feed cost.

From the standpoint of farm and herd management, however, we believe that the six weeks' period betwen October 15 and December 1, is the best possible time for a cow to freshen. Consequently, breeding season in the dairy barn should be between January 6, and February 21.

There are many reasons why a cow freshening between October 15th and December 1st will do better than one freshening earlier or later.

Perhaps most important of these is the fact that by this time she is usually in the barn and can be fed *as an individual* and according to her production needs.

Probably of equal importance is the fact that she gets a stimulus to sustained production near the end of her lactation period when she is turned out to pasture in the Spring.

Such a Fall freshening cow is favored by being dry during the latter part of July and August when, as every good dairyman knows, it is practically impossible in spite of everything he can do, to "keep a cow up" during this time of short pastures, hot

weather, flies and the demands of a thousand and one farm duties.

Important as Fall freshening is for cows it is doubly important for heifers. It is the writer's considered opinion, after studying a large number of herds, that only very rarely should an exception be made to the rule, *breed your heifers to freshen in the Fall.*

We have advocated this policy for years and have frequently been asked how can you breed your heifers to freshen in the Fall when they were born in the Fall? Would you breed them to freshen at 24 months of age or hold them until they are nearly three? Surely you must do one or the other.

Our answer is always, "Heifers that are properly grown will be both old enough and big enough to breed at 15 months. Then they can start to pay dividends at 24 months."

There are a few calves, even on such a birth controlled farm, that escape the proper birth date. How should they be handled? A safe answer to such a question is, "Breed those heifers born after January 1 to freshen in August following their second birthday. It is true that such a policy means holding such heifers "open" a second Summer. That is admittedly a disadvantage, but to those who question such a policy we can only say, "Your heifers, *if they have the* inheritance for high production, will produce enough more to make the benefits more than worth the price."

To summarize then, let us point out that no where on earth is birth control more important than in the cow barn. Proper birth dates for your calves, from August to January 1, with most of them in October and November, will give their mothers the best chance possible to produce at their full capacity and thus make the most profit for their owners.

Heifers born in the Fall can, when properly raised, freshen at 24 months, in the Fall. They, in turn, will be given their best opportunity to produce at full capacity and thus start paying their board bill at an early age.

As further proof of the wisdom of birth control in the cow barn, we could cite the experience of most of our most successful dairy farmers. Almost to a man they will say "breed your cows, and especially your heifers, to freshen in the Fall. A cow freshening in the Spring is just like a baseball player walking up to bat with his hands tied behind and two strikes called against him!"

Let Performance—Not Looks—Be Your Beef Guide

Condensed from Successful Farming

Bradford Knapp, Jr.
United States Department of Agriculture

RECENTLY I sat at the ringside of a purebred bull sale. Top bull of the sale was in the ring, and bidding was slow. One of the outstanding breeders arose and stated that you could just tell by looking at this bull that he would sire the right kind of calves.

I wonder if that breeder actually believed what he said. Yet this statement is only a part of the hocus-pocus of purebred beef-cattle breeding. The breed papers carry article after article on the selection of future herd sires and how prepotency may be seen in a bull.

I asked a successful breeder of one of the beef breeds, "When do you select your future herd sires?" His answer was, "After the second half crop from a bull." The thought in my mind is that breeders themselves do not believe this nonsense but keep preaching it in the hope that it will come true.

Let's face the issue of beef-cattle improvement for the farmer, rancher, feeder, and consumer. This present national emergency, as well as the period of readjustment following, is a time for saving of feed, with a real need for a bigger return from each animal unit.

What is the ideal beef cow? Is it one merely with a feminine head and a docile look in her eye, or one that will raise every year a calf weighing 500 pounds at eight months of age? Is it one with a wide-sprung forerib and not enough milk to suckle a kitten, or a big roomy cow that gives enough milk to raise a real calf? Farmers and ranchers know the answer, but some purebred beef-cattle breeders stick to the nurse cow. There is no place in practical beef-cattle breeding for nurse cows.

What is the ideal beef bull? Is it one that has a string of purple ribbons on the basis of appearance or one that sires calves which make good use of their feed? Many show bulls have never sired a good-doing calf. The problem, then, becomes one of determining which bulls sire

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the desired kind of calves and which cows raise the big calves.

The Bureau of Animal Industry, in cooperation with the Minnesota Agricultural Experiment Station, has recently proposed a method of sire-and-dam testing that will aid in determining their economic value for beef production. This method on test has proved valuable as a means of detecting superior breeding animals.

On a recently completed test of five purebred beef sires at one station, the average sales price of the steer offspring (by sires) at 15 months of age ranged from $93 to $105 per head. The cost per 100 pounds of gain varied from $9.12 to $9.78. The daily gain of the steers from various sires averaged 1.75 to 1.95 pounds.

Calves from one of these bulls (one of a second generation of selection by these methods) produced the average daily gain of 1.95 pounds at a cost of $9.12 per hundred pounds and brought the $105 per head average on the market. This bull surpassed all others in returns, profits, gains, and efficiency as measured by his progeny. And that is not all—none of his calves were poor feeders, while as high as 50 percent of one of the other bull's calves were poor feeders. These results are by no means exceptional.

Yes, you may say, but what about the meat angle? This very superior bull may sire calves making off-type steers which would not sell well on the fat-cattle market. The progeny of this bull brought $11.75 per hundredweight on the Chicago market, and were surpassed by only 10 cents per hundred by one other bull. These calves dressed out approximately 61 percent and made carcasses of good grade. The poorest steers from these bulls dressed out 58 percent.

On appearance these five bulls would have placed A, B, C, D, E. On performance of their calves, considering every point, they would have placed C, A, B, E, D. Bull C was the outstanding individual of the group. The important thing to be remembered is that the appearance of a bull is a poor criterion of his breeding performance. There are a lot of "Grand Champion Lemons" siring calves that are hidden out on the back ¶0.

The method of perfórmance testing proposed by the Bureau of Animal Industry and the Minnesota Agricultural Experiment Station is designed to aid in selection of better breeding animals. Sires, dams, and calves are rated on their beef-production ability.

It is recommended that cows which do not produce enough milk to raise a growthy calf be

culled from the herd. We have records of beef cows that give less than 100 pounds of milk during a lactation period of five months, with a daily average of one-half pound. One-half pint of milk a day will never grow a good calf. No male calf should be saved for breeding whose dam does not give sufficient milk for his development.

The final evaluation of a female is based on her ability to raise a good healthy calf. A sire is rated on his ability to get calves that feed qut well and produce the type of carcasses demanded by the consumer. It is recommended that steers be sold and slaughtered to determine the meat qualities of the offspring from a sire.

Looks are fine, but proof of the pudding lies in ability to transmit favorable characteristics to the offspring. Without this ability to transmit desirable characteristics, all of the plaudits of an admiring multitude and all the blue and purple ribbons are of little practical value.

Barn Slaves Revolt

Condensed from Capper's Farmer

A revolution in dairy cow housing and feed storage is under way. It has been fomenting in a dozen states for 10 or 15 years. Pioneers are breaking with traditions which keep them at chores when they should be afield, revolting against a building investment that is inordinately high, forcing a reduction in the labor price they pay for milk. Farm economists, engineers, architects and dairy specialists look on and cheer.

Many a dairyman is slave to his barn. Some even are just now beginning servitude to a barn which, altho the paint still is wet, bears no resemblance to modernity save in a few superficial features.

It was the conventional barn, with its big Gothic roof, its imposing ventilator vanes, its cavernous mow, its low rows of stanchions and its endless capacity for manure accumulations that finally engendered the revolt—that, with the struggle required to pay interest on investment. Symbol of prosperity, seemingly—symbol of mortgage debt, actually.

The first break came with the milking stall unit and shed-type housing. Then came the pen barn, the loose cattle barn, the risk-spreading, one-story unit type; the bow-string barn; the changes in feed storage in relation not only to new barn design but also from the viewpoint of feed harvest. Each departure from the conventional added something to the next. It was an evolution as well as a revolution.

And now the latest contribution is from Michigan. A barn built by Louis Allais in Van Buren County combines all the advantages of the one-story, pen-type and milking stall with feed storage. It is so new that C. H. Jefferson, department of engineering, Michigan State College, who was Mr. Allais's consultant in construction, is not yet willing to give it unqualified approval. Nevertheless, the Allais barn:

1—Offers all the labor-saving, cow-health, cow-comfort advantages of the pen or loose cattle barn.

2—It affords cattle housing, hay and grain storage, milking stanchions and milkroom all under one roof.

3—It provides all that and still affords the advantages of a single-story structure, with its finan-

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cial economies, wind, weather and cold resistance.

4—Per cow housed it cost half as much as the conventional type.

The old barn which it replaced was destroyed by fire. Said Professor Jefferson: "Allais was determined not to replace it with a 2-story barn. He also wanted to keep the cost below $100 a cow, which he had been told would be the probable cost of a new barn of the old type. The one which we planned for him was built for about $3,000, which made the cost $50 a cow for animal shelter, feed storage and milkhouse."

Hay storage is provided thru use of loft and stable space which usually is wasted in conventional structures. The barn is 42 feet wide and 124 feet long, with a double concrete manger thru the center. A portion of the usual ceiling and of the upper stable space is replaced by a V-shaped hopper-type hayrack or feeder which forms the lower section of the mow. This hopper discharges into a double manger. Its framing timbers angle upward, past the ceiling level, and thru the loft to support the rafters.

The theory of this combination V-shape mow and rack was that it would feed chopped hay down automatically, but J. H. Curtis, manager of the farm, says the roughage packs, bridges and must be prodded. Improvements may make the device function better, but even if the effort fails he considers the fault inconsequential.

"I cut holes in the hopper wall and claw the feed down with a stick," he explained. "This makes the easiest hay feeding I've ever done. A man can poke enough down in 5 minutes to do the cows all day."

Doors in the hopper walls above mangers will admit baled hay.

The mow stores 65 tons of hay. The only floor in the loft is outside the hopper, under the lower roof slope. The first winter some condensation occurred under that portion of the roof directly over the floor. This was remedied by insulating the floor with chopped hay.

Barn walls are of hollow masonry blocks and the roof is of sheet metal. Dead air spaces in walls and the low loft with insulation afforded by hay makes the structure exceptionally warm and usually some windows are kept open in winter.

Passage for cattle and manure spreader is provided around each end of the manger and hopper. There are sliding doors on each side. Cattle run loose in the barn and usually can go outside into a lot at will. Across the front is a 5 stall milking stable with stanchions placed end to end. Each stall has 2 gates, one each for cows to enter and leave. Ropes

and pulleys are used in operating sliding doors between loafing pens and milking compartment. Cows enter on the east side and leave on the west. Overhead is space for grain concentrate storage.

Stanchions are set on a platform 18 inches high, and adjacent to it is the attendant's alley, which connects with the milkroom at the end of the barn.

"We haven't lost a cow, had a sick or injured one nor any udder troubles since we began using the new barn," said Mr. Curtis. "The herd has been cleaner, healthier and more comfortable. Less care and labor have been required in doing chores. Altho only 23 cows were housed in a barn designed for 50, they were comfortably warm during winter.

"The hopper type of mow is a great labor saver. In filling it we loaded hay over a rope on a flat platform truck. At the barn we threw the rope over the top of the load, tied the loose end to a deadman and rolled the hay off by driving the truck out from under it. Altho this method was a little slower than the customary way, it was cheaper. For instance by using the cutter I replaced 4 men in mowing hay, and nobody had to work up under that roof in the heat."

Cows are watered from an inside tank adjacent to the wall. One mistake was made in constructing it, Mr. Curtis explained. No guard was provided to prevent a cow from being tossed or crowded into it, and that is likely to happen, as he discovered from experience. Supports for a rail of some sort should have been imbedded in the cement. He remedied the fault by putting guards over the top of the tank.

Tractors in Wartime

Condensed from Farm Journal and Farmer's Wife

Fred Hawthorn

AS an agricultural engineer with 26 years of tractor-farming experience here in western Iowa, I have some suggestions for keeping your tractor running.

The most valuable lesson I have learned is the value of proper lubrication. Lack of it has ruined more tractors than any other cause.

A common trouble is dilution of oil caused by raw, unvaporized fuel escaping past pistons into the crankcase. A remedy for that is to have motor temperature high enough to completely vaporize the fuel used. Distillate requires a higher operating temperature than gasoline; the motor must be hot before switching to distillate. Even with gasoline, a motor should warm up before starting hard work.

Another serious lubrication trouble is formation of sludge, caused principally by condensation of water vapor inside a cold crankcase. Most fuels contain a trace of sulphur which unites with this water, forming weak sulphurous acid. An emulsion containing acid, water, oil and particles of dirt, carbon and motor grit is beaten up by the connecting rods into a sticky, gooey mass known as sludge, which may etch and corrode metal parts, clog oil lines, pumps and screens, and do untold motor damage. If there is evidence of sludge, the oil pan and screen should be removed and thoroughly cleaned.

When a tractor uses too much oil, you can be sure your tractor is wasting fuel and losing power. This trouble is caused by plugged oil rings, or worn rings, pistons, cylinder walls and bearings. It is poor practice to try to correct this trouble by using a heavier-bodied oil. Oil can not take the place of metal. The remedy is an overhaul job, best done by a trained mechanic in a well-equipped shop.

Sticking valves may be caused by poor-quality oil, but more often because of valves leaking and overheating due to lack of clearance, or a poor seat. Check valve tappet clearance at least once or twice a season. Reconditioning of valves and seats requires the use of special refacing and re-seating grinders.

Keep the gear case filled to the

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test plug with the right grade of good-quality lubricant, and you need not worry about transmission and rear end lubrication. The tendency has been toward lighter transmission oils, so we must watch the oil seals a little closer and replace any that start to leak. A minute a day with a pressure grease gun will take care of the few other moving parts such as throwout collar, steering mechanism, etc.

Just a word about buying oil. Choose the body or viscosity number recommended by the manufacturer; buy from a reliable company; and get the very best quality offered. A tractor in good mechanical condition will use very little oil. Good oil will help keep it that way longer.

Tractor enemy No. 1 is dirt. In one season it practically ruined my first tractor, bought 26 years ago. The story is different now, for every tractor sold is equipped with an oil bath air cleaner. This wonderful device is almost 100% efficient, but can not continue to do the job unless properly serviced.

How often to service your air cleaner? That depends entirely on dust conditions—and herein lies a danger. In long periods of operation in dust-free air we are apt to become careless, and then neglect our cleaners when we get in dusty conditions again. When in doubt, service the air cleaner. Even if it doesn't need it, no harm will be done. Remember, too, that this device is of little value unless all connections between it and the carburetor (as well as all intake manifold gaskets) are kept tight.

Wash the crankcase "breather" occasionally in tractor fuel, and dip in lubricating oil before replacing.

Now about the oil filter—this takes out particles of dirt, carbon and motor grit, thus prolonging the useful life of the oil. However, the oil filter will not remove certain chemical impurities which in time thin the oil and destroy its lubricating qualities; hence, periodic drain periods are still necessary. Follow the manufacturer's instructions on changing oil, also on frequency of servicing or changing the element in the oil filter.

Cleanliness pays big dividends in handling fuel, oil and grease. We have found an underground tank and an inexpensive rotary pump most desirable for storage and delivery of fuel to tractor. If barrels are used, and if no shade is available, build a cheap shelter over them so as to cut down evaporation losses and gum formation which increase with higher temperatures. Fuel experts claim gasoline should not be kept in storage over 60 to 90 days.

In spite of precautions, dirt or water do get into the fuel tank

now and then, and a sediment bowl with screen is provided to trap them before they get into the carburetor. Clean this device occasionally.

If a motor overheats, first check fan belt tension and water pump. Also, see that radiator core is not clogged with bugs or chaff. We always use a bug screen, as it is much easier to clean than a clogged core. If a thermostat is used, be sure it is not stuck shut.

Hard water used in a cooling system will eventually lime up radiator and water jackets (just as in a teakettle), causing motor to overheat. Flushing once or twice a season with a special radiator compound will help keep down this deposit, but a bad case is a job for a radiator service station. If you use nothing but soft water this can never happen.

A few simple adjustments have a lot to do with economical tractor operation. First, there's the carburetor. It is a common error to believe that the leaner the mixture the less the fuel used. As a matter of fact, too lean a mixture actually wastes fuel, is one of the common causes of overheating, and is hard on valves.

The carburetor setting that will give best fuel economy is a little too lean for best operation; the maximum power adjustment is a trifle too rich. In between these two settings is one that will give good economy, smooth operation, and around 95% of full power. This can only be found by trial under load.

Magneto timing is another important item, but it varies with different motors. Follow your instruction book on this. If still in doubt, consult your dealer. One warning applies to all tractors. The impulse starter must snap slightly past dead center, never before, or broken arms may result when cranking. Spark plug and magneto point gaps should be set to recommended clearance occasionally, and new plugs should be put in when electrodes become badly worn.

Valve tappets should be checked for clearance at least a couple of times a season. Lack of proper tappet clearance probably ruins more valves than all other causes put together. Valve warping is sometimes caused by suddenly stopping a motor that has been under a full load with valves red hot. Let a motor idle a short time before closing switch so that valves may cool more gradually.

Keep clutch tight enough so that it will not slip under the heaviest load. A slipping clutch will soon burn out its lining. Wear on clutch will be lessened if engaged at reduced motor speed and the load then picked up by opening the throttle governor.

Accurate row crop work is impossible with a tractor that has a sloppy steering mechanism. More-

over, the excessive back lash may cause breakage. A simple adjustment is provided to take up end play in worm, which should be kept as snug as possible without binding.

Front wheel bearings should also be adjusted at first sign of play. At least once a season the wheels should be removed, cleaned and re-packed with fresh grease. Replace any grease seals where there is evidence of dirt working past them into bearings.

Proper loading plays an important part in efficient tractor operation. A recent university test showed that it cost 85 cents to operate a certain tractor at half load and only 95 cents at full load. This plainly illustrates the poor economy resulting from part load operation. On the other hand, too heavy a load causes excessive slippage.

Between these two extremes there is the desirable drawbar load that will give what engineers call "maximum tractive efficiency." It may surprise some to learn that this point occurs when wheel slippage is around 10%, even as high as 15% on plowed ground. When so loaded and operated in a gear that will work motor to nearly its full capacity, our tractors will give us the greatest number of acres per gallon of fuel, which is the goal we all like to shoot at.

New Developments in Dairy Cattle Feeding

Condensed from Certified Milk

W. E. Krauss, Ph.D.

Dairy Department, Ohio-Agricultural Experiment Station, Wooster, Ohio

UNDERSTANDING of the makeup of the bovine stomach and the ability of this organ to manufacture protein and B-complex vitamins simplifies the problems of dairy cattle feeding.

In calves it has been possible to raise as satisfactory animals on simple grain mixtures like corn and oats as on mixtures containtaining several additional ingredients. In cows just as good production was obtained on a grain mixture of corn and soybean meal as on corn, oats, linseed meal, wheat bran, soybean meal, molasses and beet pulp.

Based upon many years of work at Cornell the fat content of grain mixtures was found to influence milk production and an arbitrary minimum fat level of 4.0 per cent was established. In an attempt to apply this information to Ohio conditions it was found that production was equal where the fat level of the grain mixture ranged from 2.7 to 4.9 per cent. This seems especially important in view of the present value of oils extracted from feeding stuffs. These results do not mean that fat has no function in milk production.

In a trial to determine whether heifers should be fed grain in addition to roughage it was found that heifers receiving grain from 8 months to freshening gained more and grew better skeletons than those receiving no grain. Furthermore their production during the first lactation was greater even though the no-grain heifers received grain during the first lactation period.

That the amount of grain fed for milk production can be less than that usually recommended was shown in a trial comparing heavy-grain with light-grain feeding when alfalfa-timothy hay and alfalfa - timothy meadows were used.

Milk fever is a condition often following parturition in Jersey and Guernsey cows. After a limited and unsuccessful attempt to control milk fever by using recommended fitting rations, the procedure of feeding large quantities of vitamin D during the last month before freshening has

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been tried with 100 per cent success to date.

With the increased demand for milk, especially skim milk, limited milk feeding of calves assumes new significance. In trials conducted by the Ohio Experiment Station it has been possible to raise normal Holstein calves on as little as 200 pounds of whole milk without using skim milk in any form. This system utilized such animal protein sources as fish meal, blood meal, and dry rendered tankage and saved about 100 pounds of whole milk and 1,000 pounds of skim milk. In Ohio alone should extreme emergency calf feeding be entirely emphasized it would be possible to release for other purposes at least 100,000,000 pounds of skim milk. Thus limited milk feeding to calves may become another of the many sacrificial services the farmer may perform.

Because of the shortage of molasses this year many will be perplexed concerning grass silage. At the Ohio Experiment Station it has been shown that no preservative is needed for grass silage when the dry matter content of the material to be ensiled ranges between 20 and 40 per cent.

How Much Did Those Pullets Cost?

Some Interesting Facts from F. F. A. and 4-H Club Records

Condensed from The Poultry Item

R. S. Wilkes

Teacher of Vocational Agriculture

WHEN most of the pullets have been placed in the laying house and are repaying the cost of their production, it is well worthwhile to analyze the costs that went into the raising of the birds.

The writer recently combined the summaries of the costs account records on chick raising which were kept by students in the Vocational Agricultural Department of the Elbridge Central School (N. Y.) during the past two seasons. The records concern a total of over 1800 chicks raised, with an average of about 300 per flock. Both White Leghorns and New Hampshires were raised, with New Hampshires predominating.

Through the analysis of these recent records, some interesting facts are brought to light. The

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figures from the different flocks have been combined and then reduced to costs and returns per 100 chicks brooded.

COST OF RAISING 100 CHICKS

Item	Average per 100 Chicks Started
Costs	
100 chicks bought	$12.00
Grain (590 lbs.)	9.60
Mash (800 lbs.)	18.00
Human labor, 42 hours	12.60
Horse, auto, truck use	1.25
Litter	.60
Fuel	1.75
Use of land, buildings, equipment	2.40
Interest on investment	1.00
Miscellaneous	.60
Total cost	$59.80
Returns	
Broilers sold or eaten (42)	$21.60
Manure produced	.60
Pullets sold (5)	3.60
Pullets for laying flock (40)	46.00
Total returns	$71.80
Gain (To Laying Age)	$12.00
Cost of raising pullet to laying age ($59.80 minus $25.80 divided by 40)	.85
Birds died	13

Analyzing the above records, what conclusions can one draw?

Does it pay to economize by buying cheap chicks when the total cost of the chicks represents only 20% of the cost of raising the pullets to laying age. Too many poultrymen have found the answer to this question. Three or four cents more per chick is not much of an item when we consider that these records show a cost of 85 cents for raising a pullet to laying age. We must also consider that an extra few cents per chick may return a profit of several dozen eggs in a year of production if they come from well-bred stock.

The amount of grain and mash fed will, of course, depend to some extent on how long the broilers are kept. The age at which one disposes of the broilers will, in turn, depend on the breed, the price of feed, the price of broilers, market preference, the amount of space one has, and a number of other factors. Probably one will do best to separate the sexes as soon as they can be distinguished and sell the broilers and pullets of low vitality as quickly as possible. Feed hoppers so constructed as to prevent waste will also do much to cut down feed bills. It is poor economy to stint on feed, yet there is no use in wasting it. According to these records the feed represents about 45% of the total cost of chick raising and a much greater per cent of the cash cost. Most commercial poultrymen find that feed represents about 50% of the total cost of raising chicks.

The other items of cost probably will not vary greatly from one farm to another.

The average number of broilers sold was 42 per 100 chicks raised, and they returned slightly over fifty cents each, so it can be seen that some of these had reached a fairly good weight when sold.

Probably most poultrymen sell them earlier but have a lower feed bill as a result.

The average value of the 40 pullets which were placed in the laying house was $1.15 each. This figure represents the average value which was set by the owners.

The cost of raising a pullet to laying age is found by subtracting all returns except the value of "pullets for the laying flock" from the total expenses and then dividing by the number of pullets raised, which, in this case was 40. This cost was found to be 85 cents, which is somewhat lower than most cost account records show. The average cost is usually a dollar or more.

A mortality rate of 13% may seem to be rather high. The state college specialists tell us that a good poultryman usually expects to raise about 90 percent of the chicks hatched.

The average poultryman probably will not keep such complete records as the ones cited here. However, he should keep a simple record of feed expense and of other major expenses, also of broilers sold, of mortality, and of pullets kept to be put in winter quarters. At that time a new record should be started.

Records such as these indicate quite definitely not only whether one is making or losing money, but in many instances they help one to determine why he is making or losing, and where certain leaks may be occurring which make all the difference between profit and loss. Figures in themselves may be of little value, but when compared with those of other seasons or with those of other poultrymen, can often be used to steer one's course toward greater profits.

May Apples Can Kill Cattle

During the late spring months, beware of death losses in calves or young cattle that have access to May apples. Usually found down and near death, the poisoned animals slobber excessively, grind their teeth, and have repeated convulsions, rolling eyes. Emergency antidotes are a quart of corn sirup containing a cupful of hyposulfite of soda. A teaspoonful of potassium permanganate crystals in a quart of milk as a drench is another old-time remedy.

—*Successful Farming*

Extending the Life of Clover Stands

Condensed from Better Crops With Plant Food

Ford S. Prince

Agronomist, Agricultural Experiment Station, Durham, New Hampshire

IF the dairymen in the northeastern part of the United States had all the clover and alfalfa hay they needed their minds would be easier on two matters at least. First, and foremost, is the need for more milk.

Then there is a nitrogen shortage in prospect, particularly of nitrates. This may be only temporary. New manufacturing establishments now under construction may be able to produce synthetically all the nitrogen that we need for our expanding war machine as well as our huge farm effort. But, just now there is a shortage of nitrates and their use will have to be curtailed this year in spite of the urge for greater production on the farmers' part.

Farmers have been synthesizing nitrogen on their farms for quite a while. The only trouble is, they don't do enough of it. They do not raise a large enough percentage of legumes to maintain the nitrogen income and outgo in proper balance in their hay and pasture fields. Maybe that is their fault and maybe it isn't. Perhaps we are all to blame for not finding a perennial legume that would fit into their long rotations, or for not working out a suitable scheme of fertilization that would keep a bigger percentage of legumes, clover, or alfalfa, in these hayfields.

Fields are usually left in hay crops as long as they will cut a satisfactory tonnage, regardless of whether there is any clover or alfalfa there.

Hay and pasture are the principal crops on the dairy farm, and most dairy herds are so large that the farmer is hard pressed to produce the hay, pasture, and silage that his herd will eat during the season.

Too often the emphasis has been placed on tonnage or bulk rather than on the quality of the roughage produced, but in most cases hayfields are left as such for five, six, or eight years after seeding, long after the legumes that were included in the mixture have disappeared.

With such a system of crop rotation, a perennial legume is a

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godsend. Alfalfa is used by some farmers with good success. Unfortunately the soils have a high lime requirement which makes a seeding costly, and because of hardpan or lack of under drainage many of the soils will not hold alfalfa long. Ladino clover is coming into prominence, serves its purpose well, and will be used more widely when seed costs are lower. Even though alfalfa and ladino are available, most dairymen place their trust in red clover, or red and alsike, and these clovers ordinarily behave as biennials. The result is that after the second hay year the clover in most cases has practically disappeared from the hayfields, leaving only the grasses that were seeded, and we need clovers, in profusion, to counteract the nitrogen shortage and to give quality to the hay.

Every farmer recognizes the value of clover, both as a feed and as a source of nitrogen. But we may have been placing too much emphasis on it in our long rotations for the conditions under which we have been farming. Perhaps we haven't grown enough of the perennials, alfalfa and ladino. Or maybe we haven't studied sufficiently the needs of our soils so that by modifying them red clover will persist longer than two years.

Plant breeders in Wales have developed a strain of red clover that has persisted under favorable conditions for seven or eight years. Workers in other countries have brought out red clover strains with a perennial tendency. Work is under way at the moment in this country on a perennial red clover. Here in New Hampshire in our red clover breeding work we have held individual plants through three full seasons without any special soil treatment.

Why all this effort on red clover? Well, it is a rugged plant, easy to grow, bulky in yield and, of course, an excellent cow hay. It will grow on soils too wet for alfalfa to persist long and its lime and fertility requirements aren't quite so high as those of alfalfa. Dean C. E. Ladd of Cornell University stated at the Pennsylvania State Grassland Conference in 1940 that a triennial red clover would be worth a million dollars annually to the farmers of New York State. If we could only make it live one more year!

That we will undoubtedly be able to do. Breeding for the perennial tendency certainly offers great promise. But while the plant breeders are studying the chromosomes and making their crosses, all of which take time, let's take a tip from an experiment which has been in progress near Claremont, New Hampshire, for the last five years and make the soil conditions right so that

clover will stay in, even while the plant breeders are doing their stuff.

Here is the gist of that experiment. A seeding of red and alsike clovers and timothy was made in August, 1937, on a field situated on a terrace of the Connecticut River Valley. The field had been in plots which were continued. Some of the plots had received and continued to get an annual application of superphosphate or potash, and others both. Still others had other treatments including lime and complete fertilizers.

No harvest was made in 1937, but hay has been cut every year since. In 1938 there was a good crop on all the plots, mostly clover. By 1939, clover had almost disappeared from all plots except those which had received potash, but in 1940 and 1941 red clover persisted on the potash plots, with not only tremendous increases in yield but in quality, too, of course. But it persisted only on the plots which had received potash, and it didn't matter what else they got.

Lime had no influence on clover persistence and, on this soil, very little effect upon yields. Superphosphate used alone didn't hold the clover nor did it increase yields appreciably. But potash held the clover there and practically doubled the yield over the untreated plots. When phosphate and potash were used together or in combination with nitrogen, the yields went to town. The potash had held something in the stand that responded—clover.

I do not mean to leave the impression that the clover was a full stand. But it was there in amounts sufficient to make good mixed hay on all the potash-treated plots. The question naturally arises, were these perennial plants of red clover or did dormant seeds lying in the soil germinate and grow? They didn't come from manure, since manure was not used as a top-dressing and none had been applied since 1936, the year before the seeding was made. Of course, we'd like to know whether they were perennials and we are studying them in our nursery. But from the farmer's point of view, it doesn't matter whether they were biennials or perennials, the feed is just as good from one type as it is from another. What we do know is that it wasn't a perennial on any of the plots that didn't get potash.

That brings us to the matter of hay yields. From the dairyman's viewpoint these are important. In the following table all the yields are compared with those of the check plots which are rated at 100, and the data are for the 4-year average on this series of plots, 1938 to 1941, inclusive:

Treatment	% of Check
Check	100
Superphosphate	99
Potash	179
Phosphate and potash	279
Complete fertilizer	307
Lime, 1 ton	98
Lime and phosphate	106
Lime and potash	196
Lime, phosphate and potash	286
Lime and complete fertilizer	303

The amounts of fertilizer used were 125 pounds of 60% muriate of potash, 400 pounds of 20% superphosphate and 100 pounds of nitrate of soda, all top-dressed annually in all treatments in which these materials were applied. Lime was not used in 1937, but the lime which was added had been applied in 1929. Manure was applied to all plots uniformly in 1936, during which year the land was in corn.

The tremendous response for potash is indicated by its comparative yield of 179. The curious minded may be interested in actual yields, which may be obtained by multiplying the percentages given by 1.145, which was the yield in tons of the check or untreated plots. Even more remarkable perhaps is the jump in yield to 279 when superphosphate and potash were used together. Nitrogen added to the superphosphate and potash (in the complete fertilizer) further increased the yield to 307.

Perhaps this is an unusual soil in the way it responds. As a matter of fact legumes have always responded very well to potash here, but they have also on other soils in New Hampshire where similar tests have been run. The chief difference brought out in our tests isn't the difference in potash response but in the response to superphosphate which has usually run higher in other tests than it did in this case. In all of our tests, however, potash appears to have a greater effect on persistence of legumes, whether clovers or alfalfa, than either lime or superphosphate.

Since an increased production of dairy products is of prime importance at this time, and since nitrogen is limited, our best bet appears to foster the production of legumes with ample potash. This can partly be done with manure. But the manure must be carefully protected so that its fertilizing value will be preserved since its potash content is very susceptible to leaching and washing away before it is applied. On fields such as the one here described, it is doubtful if manure can or should be used in amounts sufficient to supply all of the available potash that legumes require, even if it gets to the field with its full potash quota.

As a matter of fact, the response in hay yields to manure has fallen off quickly in this and other tests which we have conducted. The effect of manure used as a variable in the experiment in

question was practically gone at the end of two years, and manure had no effect on clover longevity. This fact, coupled with the results of soil tests on these plots which show no accumulation of available potash even with annual topdressings, leads us to believe that any available potash in manure is quickly rendered insoluble after its application by being fixed in the soil in some exchange complex. Unless manure is used, then, as an annual topdressing or unless potash is applied annually, clovers are destined to go out.

Farmers often have reported that topdressing an old hayfield with manure brings in clover, and have wondered why clover has appeared after an application of manure. We have always casually explained this phenomenon by saying that probably the manure carried clover seeds which had passed through the digestive tracts of the animals. Maybe that is a partial explanation, but after studying the results of the above experiment we are inclined to ascribe more credence to the idea that clover has come into the stand in these instances because manure temporarily raised the potash level of the soil.

There is a nitrogen shortage. There is always a deficiency of *good* cow hay in New England. This seems to be a good time to let potash "pinch-hit" for nitrogen by using more of it or taking better care of manure to grow more clovers. Farmers who find that their soils respond to potash, as this one does, and capitalize on that fact, will certainly be well repaid during the next few years by harvesting better hay with more clover in it and thereby adding to the nitrogen supply of the farm.

Poultry Discovery

Daily hormone injections at the University of Maryland, into immature pullets at 10 to 14 weeks of age, and for a period of 28 days stimulated early sexual maturity by approximately 20 days over other pullets kept as controls. The practical applications of these findings would help to raise the present level of 110 eggs per bird to 150, which is necessary for producers to secure a reasonable labor income from their flocks.

—*American Poultry Journal*

Flying Sheepskins

Condensed from Marketing Activities

C. L. Harlan
Bureau of Agricultural Economics

AN Eskimo would gladly swap his fur-lined parka and other cold-resisting apparel for an Army flyer's sheep-lined suit. Scientific tests have proved that the ordinary sheepskin is far warmer than other furs — and that includes bear, beaver, fox, rabbit, and wolverine pelts. Sheepskins are also better able to stand up under the heavy wear the flyers give them, the skin part of the pelt being treated in such a way as to make it flame-proof, wind-proof, and acid-proof. In view of all these advantages, it is no secret that the Army is in the market for sheepskins or "shearlings"—pelts with wool from three-eighths of an inch to an inch in length.

There is only one catch to the story: It takes 12 shearlings to outfit an aviator with parkahood, jacket, gloves, pants, and boots—or about 90 square feet of sheepskin. Now multiply that figure by 65,000 — our airplane goal for 1942, and then multiply by about 3 — pursuit ships take one man and the bombers take more. The result is big enough to make any sheep worry about his skin—and enough to make the Army wonder if there will be enough pelts to go around.

In normal times, about half of the 6 million shearlings used annually in the United States come from Australia, New Zealand, South Africa, and South America. However, the import situation is complicated by British control of the principal overseas sources. Since the British need shearlings for their own flyers—it is likely that the British Wool Board may curtail shipments to the United States this year.

Because of our large military requirements, together with the uncertainty regarding imports, the entire United States supply of shearlings has been reserved by the War Production Board for military use. The WPB has ruled that wool may not be pulled from sheep or lamb skins when the wool is one inch or shorter and when it is of 46's grade—a medium coarse wool—or finer. Tanners may not tan nor dress shearlings except for use in Government contracts.

Reprinted from Marketing Activities, June, 1942, Washington, D. C.

The allocation of our shearlings is a necessary step, of course, but it looks as if we would have to go a little further and increase our domestic supply some way or other. For a number of reasons this is a difficult job.

The principal source of shearlings is from yearling Texas sheep that have been shorn of their wool—mainly wool of the finer grades — along in March and April. Some of these sheep are held on Texas ranges until April, May, or June, and by that time their wool is long enough to meet shearling specifications. Others are sold to feeders in the Corn Belt, where they are fattened for varying lengths of time. When sold they may have wool ranging in length from a quarter of an inch to over an inch. Other shearlings from Texas come from fall shorn yearlings and spring lambs marketed by the end of the year.

The next most important source of shearlings is from early spring feeder lambs in California. These lambs are shorn in May or June and finished on ladino clover pastures in California or shipped to Corn Belt feed lots where they are fattened for market. Another source of shearling skins is from so-called "shearing" lambs, which are mostly tail-ends from feed lot lambs that are bought by commercial feeders, shorn, and then fed for some weeks before being marketed. Also, some lambs from Colorado and other western feed lots in the early spring may be moved to commercial feed lots, shorn, and then fed further before going to market.

Most of the annual supply of shearling skins is available in the second quarter of the year from animals slaughtered not too long after shearing, and to increase the supply involves a disruption of the usual producing and marketing methods.

Here are some of the difficulties: Few range producers who sell slaughter or feeder lambs in the late summer or fall will shear their animals before shipping because the small quantity of very short staple wool per head—even considering the relatively high price of shearling skins — would hardly offset the cost of shearing, extra shrinkage of the lambs, and the possibility of heavy loss following cold fall rains or early snow. It is also doubtful whether Corn Belt or western feeders, who feed their lambs in the open, would be very keen buyers of shorn lambs. Such feeders ordinarily do not have facilities for shearing lambs nor the right kind of shelter for shorn lambs. As the saying goes, the wind must be tempered for the lamb whose wool has gone to market.

The most promising method of getting shearlings from these winter-fed lambs would be to

move them to commercial feed lots, shear them, and put them on feed for a few weeks. Additional shearlings could be obtained by shearing native lambs in the late summer and holding them for some weeks before marketing. A fair fleece of lamb's wool could be shorn from such lambs, but the shearlings would be mostly a coarse wool type.

Another method of getting short wool shearlings would involve shearing lambs bought for slaughter so as to leave about a quarter of an inch of wool on the skin. This, of course, would mean a considerable shrinkage in weight and possibly some deterioration in quality.

The Department of Agriculture is well aware of the problems that complicate the shearing situation, but such problems do not appear to be insurmountable. If we can build 65,000 airplanes a year and train pilots to fly them, we can certainly round up enough sheepskins somewhere to keep those pilots warm.

Start Some Chicks Out-of-Season

Condensed from Everybodys Poultry Magazine

Roland C. Hartman

IF you were to dig up all the reasons why more and more poultry raisers have been taking to out-of-season brooding in recent years, you'd find they all sum up to the fact that it turned out to be a profitable idea in poultry management.

A summary of all the advantages in brooding chicks outside of the spring months would give you a lineup of points like these:

1. More chicks can be started without increasing the cost of the equipment.

2. It makes it more nearly possible to keep the laying house filled to capacity.

3. The supply of eggs available throughout the year is more nearly uniform, and so is the income.

4. Expenses are distributed more evenly throughout the year, and there isn't that heavy load to carry when the brooding is confined entirely to the spring months.

5. There is better distribution of labor throughout the year.

6. Culling can be stricter.

Reprinted by permission from Everybody's Poultry Magazine, June, 1942, Hanover, Penna.

7. Disease hazards are reduced.

This year, more poultry raisers could well consider out-of-season brooding. When our government asked for increased egg production this year, it hoped that the additional eggs could be supplied without greatly expanding the housing and equipment facilities. The first two points are particularly important, therefore, under present conditions.

One Pennsylvania poultryman who has more than a decade of year 'round brooding experience behind him figures that he would have to have three times as much money in equipment if he went back to starting all of his chicks in the three months when most chicks are bought.

It is a common thing for poultry houses which are filled with layers in the fall to be only 60 per cent full nine months later. Culling and deaths are responsible.

If by brooding the year 'round the house can be kept more nearly filled to capacity with layers, it means that the annual egg output from that house is greatly increased.

Some poultry raisers are starting chicks every month the year around. This is possible on the larger plants. Under most conditions, it is probably best to figure on only three or four broods per year . . . January, April, June or July, and September. The midsummer brood could be eliminated in favor of one in August or September.

By having pullets come into production at different times of the year, culling can be more rigid. There is a tendency on the part of most poultry raisers to hang on to the questionable birds too long, and the result is that a lot of boarder hens are being fed. There is no need to do this when replacement birds are available.

With out-of-season brooding, the proportion of small eggs to large eggs throughout the year is likely to be more uniform. Some objection is raised to the fact that late summer hatched chicks don't come into production until the early part of the year when egg production is heavy and prices are low. This disadvantage, however, is offset by the fact that those pullets should by mid-summer, if properly handled, be producing large eggs. That is the time when eggs are usually becoming scarce and the market is rising.

On the fall and winter hatched chicks, there is likely to be less trouble with diseases, particularly coccidiosis which thrives in moisture and warmth. These conditions are not present at that time. On the summer broods, however, vigilance will have to be exercised.

One thing frequently observed by those who start chicks in the

summer or fall is the fact that the average production of the mature birds is, as a rule, higher than that of the spring hatched pullets. The explanation is that the hens which are still laying during the summer and early fall are the best layers. The hens that didn't have the stamina to last are not producing hatching eggs at that time.

In summer brooding, the general procedure of starting the chicks, teaching them to find the heat, and getting them to eat, are the same as in spring brooding. Temperatures will have to be watched more closely, however, to prevent overheating. Electric brooders and oil stoves which can be throttled down give good results on summer brooding.

If you are in the habit of starting 300 to 350 chicks around the brooder stove in your spring broods, reduce the number by 75 or 100 chicks on the summer and fall broods. There is more danger of overheating on the summer chicks, while increased confinement of the fall and winter chicks during the growing period means that they will have to have more house room as they grow.

Ventilation of the brooder houses must be watched in summer. A particularly large opening at the back of the colony type house is desirable. If possible, brooder houses should be placed near a field of corn or at the edge of a woods to take advantage of natural shade. This will increase feed consumption and encourage growth.

Don't continue the heat too long, especially in summer. The chicks should be trained to use the roosts just as soon as they have feathered sufficiently well so that they no longer have to be under the brooder canopy. On the fall and winter hatched chicks, heat should be discontinued when the chicks are seven to eight weeks old. Fall hatched chicks which are permitted to go out of doors during the rearing period, even when there is snow on the ground, seem to feather out particularly well.

With new pullets coming into production at different times of the year there will have to be some shifting of layers from one pen to another to make room. This job has to be done carefully to avoid upsetting production. The use of a moist mash to maintain feed consumption at such times may be advisable.

The Farm Security Way—To Security

Jack H. Bryan

Farm Security Administration

THE Farm Security Administration is called the small farmers' "bank" — the only bank which many of them, with little to offer as security except their character, can turn to for credit.

Farm Security is often described as an "adult education program" for low-income farm families, bringing to them advice and guidance in modern, efficient methods of farming and homemaking.

This agency of the U. S. Department of Agriculture combines credit with practical education in a program of rural rehabilitation aimed at giving economically submerged farm families the chance to work toward a decent standard of living and to be respected citizens, with a voice in the affairs of their communities.

Critics of Farm Security accuse it of encouraging "ne'er-do-wells" to be dependent on the Government. The agency's officials reply that Farm Security has taken thousands of depressed farm families off relief, saved thousands more from having to go on relief, and is helping the majority of its borrowers to become self-supporting.

Cost of the rehabilitation program, including the cost of supervision, all losses, and every other item of expense, has amounted to $72 annually for each family aided, FSA officials explain, pointing out that this is the lowest cost to the taxpayer of any kind of help for families needing Governmental assistance. Work relief, by contrast, costs from $350 to $800 per year per family.

FSA officials declare the money spent in helping families the Farm Security way is being repaid to the Nation many times over in these days when America is having to mobilize all of her strength and productivity for the all-out war against Axis tyranny.

The farmers who have been rehabilitated, who have had their hopes for their children, their faith in themselves and their country restored, are repaying, they point out, by using their improved skill and resources to increase production of foodstuffs vital to the Nation's war needs. And they are buying war bonds and paying taxes out of the small profits earned as a result of their improved situation, and they are sending sons to the armed forces —sons who are healthier speci-

mens of American manhood than they would have been if the Government had done nothing to help their families free themselves from the degrading effects of poverty.

The Farm Security program came into being in the depths of the depression after droughts, floods and the collapse of farm prices had impoverished hundreds of thousands of farmers. Long-neglected evils in the agricultural system—unscientific one-crop farming, unsound tenure systems, careless use of the land leading to destruction by erosion of millions of acres of soil—had finally brought bankruptcy and despair to farmers in virtually every county in the Nation.

Aware that there were slum conditions in rural America as shameful as those in urban America, that agriculture had its share of the one-third of our population described by President Roosevelt as "ill-fed, ill-clothed and ill-housed," the Government extended relief to stricken families on the land as well as to the jobless in the cities and towns. But a conviction grew upon those concerned with administration of relief in rural areas that while subsistence grants relieved acute distress of needy farm families, they did not correct the conditions responsible for rural poverty. They decided that what was needed was a rehabilitation program that attacked the causes of poverty and helped farm families to get back on the road to independence.

The FSA program has aided about a million families. This is a sizeable number of plain dirt farmers who have been given the opportunity to better their living conditions on plain dirt farms; yet there are a million-odd additional families on farms in the United States who are prospects for rehabilitation but whom Farm Security hasn't been able to reach. According to the latest U. S. Census, 2,412,000 farmers had incomes in 1939 of less than $800, including the value of all the goods produced for home use.

Farm Security carries on its rehabilitation program with two main types of services: money for loans and grants, and trained personnel to work with individual farm families. FSA farm management and home management supervisors serve every agricultural county.

A farmer who is an owner, tenant, sharecropper or farm laborer, living on a farm from which he derives most of his livelihood, or one recently from such a farm, or the recently married son of a farm family, may obtain a loan for a five-year period at five percent interest to enable him to carry out a sound farm and home management program with proper equipment, and with due regard

to sanitation and health.

Also, he must have been unable to obtain adequate financing from a bank or other lending institution, and must be willing to carry through a good farming program.

Loans for rehabilitation have totaled 670 million dollars to 960,000 families. The borrowers have returned to FSA 300 million dollars, nearly half the amount loaned, and an additional 30 million dollars in interest. Many borrowers have repaid in full. The percentage of collections to maturities is running more than 80 percent, and is increasing as borrowers realize the benefit of better prices for their products. FSA officials consider this a remarkable repayment record in view of the fact none of the borrowers was considered a good credit risk, in the commercial sense, at the time of coming on the program, and also in view of the unfavorable farm price situation of the last several years.

Figures as to the economic advance of Farm Security families are impressive. They have increased their net income 80 percent since receiving their loans, or from an average of $480 to an average of $865. Their net worth has increased 43 percent, or from an average of $871 to $1,242. Last year the average borrower-family raised $327 worth of foodstuffs for home use as compared with $163 the year before coming on the program. This included 64 percent more milk and 94 percent more pounds of meat, on an average, as well as 114 percent more quarts of fruits and vegetables grown at home and canned and stored for winter use.

Small direct grants are made to low-income farm families at the time of intense need or distress to enable them to meet emergency needs for subsistence, immediate medical care and hospitalization, sanitary facilities, and essential household equipment. The farmer performs some stipulated work to improve conditions around his place in return for the grant.

In his first interview with an applicant, the county FSA supervisor tries to find out just what the farmer's troubles are—and why—and what he needs.

If the farm the applicant is living on is not suitable, either because it's too small, or unfit for productive farming, or if the applicant doesn't have a farm, the county supervisor does what he can to help him locate a desirable place. He then brings the applicant, if he is a tenant, and the applicant's landlord together to work out a written lease that will assure some security of tenure to the farmer and his family. One of the major causes of rural poverty is insecurity of tenure — thousands of tenants move from one farm to another every year.

Next an effort is made to adjust the farmer's debts. In most of the counties, committees of local citizens cooperate with Farm Security to adjust farmers' debts to their capacities to pay. This service is available to all farmers, whether or not they take other part in the FSA program. Often the committee succeeds in effecting an agreement between the farmer and his creditors for extending the time of payment, scaling down the debt, or refinancing part of it through the FSA loan.

The county farm supervisor and the home management supervisor then go to the applicant's farm and sit down with the farmer and his wife to work out a plan and budget for operating the farm and running the household. On one side of the farm and home plan are listed all the expenditures the family expects to incur for the coming year, and on the other is listed the anticipated income. The loan is made for the amount needed to bring anticipated income and expenditures into balance.

The farm and home plan aims at diversified, "live-at-home" farming. It calls for home production and preservation of a year-around food supply, year-around supply of feed for the livestock, and for at least two sources of cash farm income. The supervisors visit the borrower and his wife at their farm at intervals to check on their progress and to counsel with and advise them on farm and home management practices, and on record keeping. Every borrower-family is expected to keep complete and accurate records throughout the year, and each year's records serve as a guide in planning the following year's operations.

Borrower-families are encouraged to join existing purchasing and marketing cooperatives, or to organize co-ops of their own. When a number of small farmers need an item of equipment or a farm or home service too expensive for any of them to own and operate individually, FSA can lend the members of the group enough money to swing the deal jointly. It is estimated that 17,600 FSA co-ops are servicing 190,000 farmers.

Through Farm Security group medical care plans, more than 100,000 low-income farm families —over a half million men, women and children—have received medical care at a cost of about $24 a year per family.

Farm Security also helps the farmer who has made a success as a tenant to buy a farm. Under its tenant purchase program 25,000 qualified farmers have purchased family farms—the first homes most of them ever owned. These loans, averaging $5,600, are for 40 years at three percent

interest. Tenant purchase borrowers have established an outstanding repayment record, 99 percent of them being current on their principal and interest payments as of December 31, 1941.

Farm Security's work does not stop with the farmer on the land; it extends help to the farmer and laborer who have lost all hold on the land and become migrants. Since 1935, FSA has built migratory farm labor camps in a dozen States. Under the camp program now in operation, there is a housing capacity for some 90,000 people. Originally, camps were established in surplus labor areas, but now with a shortage of agricultural labor, camps have assumed greater importance. Workers must be induced to come into shortage areas, and the advantages which the camps offer have proved of value in supplying large farms with needed labor.

Other wartime activities in which Farm Security has engaged have been helping re-establish families who have had to evacuate farm land taken over by the Government for military purposes, and placing Americans on farms which were being operated by Japanese before their evacuation by the Army from the West Coast.

Branding Calves

Something new in iron heating for branding calves is the method used on Jim Cox's ranch in the Rio Grande Valley, New Mexico. Instead of getting wood and making a fire, then having to keep the fire up (and maybe not get the irons hot enough), Jim Cox uses a weed burner.

After the weed burner is started, the nozzle is placed inside a six-inch pipe about three feet long with a hole cut in one side. Branding irons are put into the flame through this opening.

—*Farm Journal*

Experiences in Breeding

Condensed from Guernsey Breeders' Journal

George M. Moffett

Blakeford Farms, Inc., Queenstown, Maryland

THE problem in any herd over a long period is to provide a succession of bulls so that each bull in succession is better than the preceding one, and better genetically than the average of the females on which he has to be used.

This is a very special danger in a breeding herd because the accidental use of an inferior bull in a herd of hitherto high quality tends to promote the distribution of the male offspring of this inferior animal into other commercial breeding herds and creates a comparatively widespread distribution of the damage and, of course, in the breeding herd in question this bull can bring about a setback and destroy the hard won progress of years.

There are, I believe, only two methods by which bulls may be selected. The first one is from their pedigree, both from our actual knowledge of the immediate ancestors and also from the long-time pedigree. The long-time pedigree is, of course, very important, but it must be recognized that the records remaining for animals long since gone are very incomplete and not accurate when viewed from a critical scientific standpoint.

The appraisal of such a bull from our current observation of its parents, grandparents, etc., is perhaps more reliable, but certainly not infallible. All of us have been able to notice the wide variation in quality of full sisters, and surely an equal variation is to be expected in the males. On the other hand, the chances are at least fair that the bull, derived from the mating of a more or less proved high quality bull with a high quality female, will be good.

The second method is by using for a particular breeding operation only proved bulls. Theoretically this is sound; practically I feel that it is open to some considerable objection. The indexes that are derived from the dam-daughter comparisons usually cover such small numbers that the result of error or circumstance in one or more pairs is apt to destroy the picture as a whole. Furthermore, the size of our

Reprinted by permission from the Guernsey Breeders' Journal, May 1, 1942, Peterborough, N. H.

breeding herds is necessarily small and so much time is consumed in getting the results from even a comparatively few pairs that in many cases the bull has died before results are obtained or has become so old that his residual life is small. So, as a matter of necessity, we do use young bulls, about which we actually know very little. If we find we have made an error in such a case it is easy enough to say we will eliminate the offspring that are the result of this error. In practice I do not believe that we do any such thing.

As I read the available records of breeding herds in this country, the story seems to be rather uniform that under the most favorable circumstances they reach an average point that can be considered as good, and from that point on the average over a long period seems to be static, varying somewhat up and down from one generation to another, but this variation is around a rather steady average, which does not tend to improve. If this is so it is pretty substantial proof that we are unable, with the means at hand, to make our bull selections so that each succeeding bull is an improvement over his predecessor.

The solution must consist of the breeder producing males that are homogeneous in their genetic make-up for those characters that we desire so that there is little or no question as to what characters and what quality of character they will pass on to their offspring. In other words, we must be able to predict, within minor error, the day the bull is born.

Now, of course, we are probably never going to arrive at anything like the absolute, and the best we can expect is a slow but substantial improvement in the average herd level, and, at the same time, a considerable narrowing of the variation within the herd. We have all noticed a great variation in quality among the offspring from various bulls that we have observed. I have studied the known and recorded offspring from a number of our most famous bulls and have come to this conclusion: That under the most favorable circumstances not much over twenty per cent of their female offspring can be classed as excellent, about sixty per cent are fair to good and twenty per cent are failures. What I visualize as comparative success would be to produce bulls that would have thirty per cent as excellent and practically all the remainder from fair to good, with substantially no total failures.

In considering the ways and means for such accomplishment I have felt it profitable to obtain the advice and help of theoretical geneticists, of men versed in the practical application of theoretical genetics, and also of practical cat-

tle breeders. The experience and the genius of all three are necessary in carrying on any attempt to solve our problem even partially.

Perhaps the greatest achievement in all breeding history is the development and production of hybrid corn. Here is a brief description of how it is done.

Single plants are inbred on themselves. Under careful control the pollen from the tassel of a particular plant, and the pollen only, is used to fertilize the silks of that selfsame plant.

Seed from that plant are grown and each such plant is inbred again on itself. This is known as selfing. Beginning with about the second inbred generation a selected number of these plants are crossed with existing varieties having known characteristics so as to obtain a glimpse of what is happening in the family that we are inbreeding.

There are two things which occur: 1, a segregation of characters as between individual members of a family; and 2, the dominant characters begin to show and are fixed and more uniform as the selfing progresses.

After, say seven generations, there is practical uniformity. That means that every grain from the ear of the plant will produce when planted an identical result.

Now, of course, not all inbred strains are good. I am told that there are not over a hundred inbred strains used in the production of hybrid seed; that a quarter of a million at least have been carried all or part of the way through the selfing process and all discarded except the few.

Now when two or more of these inbred strains are combined by cross fertilization the resultant seed when planted produce plants exhibiting in combination the dominant characters of the inbred strains. And, also, whatever vitality has been lost or masked in the inbreeding process is regained and even shows additional virility. This is so uniform in occurrence that it has its own special name—Hybrid Vigor.

Now by the above process it is possible to produce seed in quantity which when planted results in amazing uniformity of type and productivity as well as having special attributes such as variable length of maturity, resistance to cold or heat, to chinchbugs, Japanese beetles and so on.

It must now be noted the grain produced from the first planting of the true hybrid cannot itself be used successfully as seed. If it is planted the recessives of the strains from which the hybrid was produced commence to come to the surface, uniformity disappears, yields drop about one-fifth, the magic is gone. Therefore, new hybrid seed must be produced for each planting.

Obviously, in animal breeding the idea of creating a generation which shall not be permitted to produce another is unthinkable.

We have seen that the plant breeder uses as his especial instrument inbreeding. With him this is a relatively quick process, there are numerous offspring in each generation and each one of the offspring is both male and female. He is able to breed an individual to itself, the most intense form of inbreeding, so his progress toward absolute fixation is rapid. None of these advantages are available to us.

We are able, however, to breed father to daughter, son to mother, full brother and sister and by utilizing what comes to hand in the successive generations deal only with characteristics originating with the single male and female with whom we began. To be sure, depending on the way the sexes happen, the strain will lean more strongly to the genetic composition of either the original male or female. A close study of these unavoidable variations should be informative.

We shall, however, as we progress find out some very valuable and interesting things.

First, whether this male and female in combination will stand inbreeding at all. Do they have hidden and unexpected faults that will cause the line to die out?

Second, segregation will occur, individual members going off at some tangent, bad or good.

Third, the characters of the family that are dominant will become not only more apparent but more pronounced.

At this point I wish to point out that the further the concentration proceeds the more certain it becomes that the individual animal will pass along these dominant characteristics to its offspring whether inbred or crossbred.

The outstanding value of inbreeding is as a mechanism by which we can find out the true genetic make-up of the strain being inbred. It is a laboratory in which we analyze the ingredients of our raw material.

Next, as the result of segregation it will furnish the opportunity through selection to steer the family down the road or roads chosen by us in the exercise of selection. Judgment used in selection will certainly be more important than ever.

This, however, is discussing the later part of the process. The beginning is, of course, a vital question.

The cow is the most important, I think. By the time she is two and a half or three, you know a great deal about her individually. If she is outstanding as a whole for individuality and production you are justified in starting with her. Having such high qualities

we know she is one of those fortunate combinations which occur none too frequently in nature. We all know cases of full sisters that differ almost as day and night.

Having such a cow, the question is how good will she be at passing on her own virtues. There is only one way to find out and that is to try it out. Some will show that they have this power and most of them will not.

I am confident they will give the clue either through their crossbred or inbred daughters.

But I feel reasonably certain that if these crossbred offspring are subjected to further crossbreeding these virtues will disappear into thin air.

On the other hand, if the crossbred daughters are bred to their own sire or if her own crossbred son is bred back to her the chances of an animal similar in genetic make-up to her are very much enhanced.

The endeavor must be to concentrate on her blood to the greatest extent possible, proceeding, however, only through individuals of great merit.

Now what about the bulls?

Anyway you consider it there is a certain element of gamble. One must start with a fairly young bull.

On the other hand the foundation for all this has been laid.

There has been in the last forty or fifty years a great development in the Guernsey breed. Many breeders have participated in this but certainly the outstanding contribution has been the sustained effort started so long ago at Langwater by Mr. Ames and continued to this day by his brother.

That kind of work has made it possible to start without undue risk of failure and with a fair chance of outstanding satisfaction of our hopes.

Next, we are confronted with the evaluation of the bulls through whom we shall carry on these inbred strains or families.

I think this can be more clearly described by citing a specific instance.

Langwater Reveller 206846 was bred to Homestead Frieda 352793 and produced Reveller's Fanny 411270. "Frieda" was a very good cow; her mature capacity was about 700 pounds of fat. "Fanny" is a much better cow in every way. She has a mature continuous capacity of well over 850 pounds of fat per annum.

"Fanny" was bred to her sire, "Reveller," and produced Blakeford Fern 584669. "Fern" appears to be a very much better animal than "Fanny"; she certainly is in conformation and she will make well over 700 pounds of fat as a two-year-old, far ahead of her mother as far as she has gone. "Fern" was again bred to "Reveller," giving us the double inbred bull that we call Blakeford Fan-

cier 303096. This bull is an excellent individual.

"Fanny" has another inbred daughter by "Reveller" that made over 600 pounds as a two-year-old. She also has a crossbred daughter by Langwater Ambassador 216197 that made over 600 pounds as a two-year-old.

Judging from the females preceding "Fancier," starting with very good and stepping up in quality and ability, the chances should be good that his characteristics for transmission will not only be good but reasonably uniform and dominant.

His mother is in calf again to "Reveller," and should we obtain a full sister and should she prove to be up to the standard of the others in this family, the expectation that he will be very potent for the good characters of his family will be raised still further.

We expect in due course to breed him back to his own mother. Should a female result from this type of mating, that should also turn out to be fully up to the average of the other families, there is no question but the concentration in this animal is very uniform and will be found to be very dominant.

In our small herd and considering the results up to date, I believe we have reason to hope that we have four inbred or female strains, which we can carry on and which are worth while carrying on, practicing intense selection within the family as we proceed. But I am sure we will find it in due course not only advisable but perhaps necessary to cross these families and perhaps with outstanding females resulting from these crosses start new inbred female strains.

It is obvious that these crossed individuals partake somewhat of the characteristics of hybrid seed, so that crossing inside this crossbred family will no doubt produce some wide variations, particularly in the first crossing, and here again selection will have to play its very important role.

Another method to be tested will be bringing another or third inbred strain in on top of the first cross of two other inbred strains, thereby producing a three-way hybrid. A fourth strain may be brought in on top of this if available, or we may bring back one or the other of the original strains used in producing the first cross.

Of course proceeding in such a manner we will have variation from one generation to the other, but such variation should not be really important, assuming that our inbred family strains have been well selected and concentrated for the primary fundamentals of sound physical structure, high production, reproductive ability and longevity. The variation should be confined to such general characteristics as

color, marking, general size, different degrees of refinement, etc.

You will, of course, see from the foregoing that it is our hope to transfer to male animals in concentrated and dominant form the genetic characteristics of very carefully selected and very abnormal high-grade females. In other words, to use the known to lift the unknown up to its own level.

When we can have at our disposal two bulls from different families, which will pass reasonably such specifications as I have outlined before, I believe there is a method that can be employed to prove the fundamental theories underlying all of this.

The other day I suggested to Guy Harmon the advisability of collecting twenty very low-class purebred Guernseys, all of the low-class as to production, and at least half of them low-class as to conformation, and breeding them to one of our selected inbred bulls, and breeding the female offspring of that mating to the second inbred bull. If we have actually accomplished anything in the fixation of high-grade dominant characteristics in our two bulls, the second generation of females will be very high-class animals, I am sure, for production and very probably for conformation. The next operation will be to select from the second generation the best animal, determined by such means as are available, and cross him with the remaining females, his half-sisters. The succeeding generation should, I believe, revert to the extent of half of the females, approximately to the low level of our original foundation cows.

If things turn out that way, then the commercial development of bulls along this general line would be justified, and such bulls could be made to cover great numbers of females through the medium of artificial insemination.

It will also be noted that if this should happen any herd using a succession of bulls of this type and having been brought to a high state of quality and productivity would be heading for serious trouble and deterioration if they attempted to use bulls out of their own herds. Under those circumstances cattle breeding would become a very special function and the necessity for the continuity of particular breeding operations would have to be very carefully provided for.

We have no illusions at all about the difficulties and disappointments that will occur in the attempt to carry out such a program, but we feel it is essential to have as definite and comprehensive a program as possible, and we are optimistic enough to hope that we will attain at least some part of our objective.

August Is the Time to Start Alfalfa

Condensed from Eastern States Cooperator

THERE is probably no better time to obtain a thick, clean stand of alfalfa than from an early August seeding. The essential requirements call for advanced preparation and thorough attention to details.

The first step is to establish a favorable soil condition. Drainage, organic matter, and favorable reaction (pH_6) with sufficient available calcium are the basic factors. A farmer might just as well throw his money away as to plant alfalfa on poorly drained land. Probably more failures can be attributed to poor drainage than to any other single factor. Although alfalfa can be grown on practically all types of soil from sand to clay, most efficient or economic production is usually found where there is an abundance of organic matter in the soil.

Successful alfalfa stands may be found on soils with a relatively low pH reaction, provided there are no other serious limiting factors, but it is usually advisable to build up the soil reaction gradually over a period of years to approximately pH_6 before attempting new seedings. Aside from a favorable reaction which might be due to the presence of basic elements such as sodium and magnesium, it is very essential to provide ample calcium for a new seeding.

Next is the question of ample soil moisture. Early seedbed preparation at least six weeks in advance of seeding helps to conserve subsoil moisture. Alfalfa seed requires for germination surface moisture, but an abundant supply of moisture in the subsoil is required for subsequent growth. Early summer crops of hay or grain which precede late summer seedings usually deplete the subsoil of moisture. Plowing under sod or stubbles may destroy capillary movement of water from the subsoil to surface.

Abundant available fertility must be incorporated with the soil at the time of seedbed preparation so that there can be a reserve supply of phosphorus and potash put down for the future needs of the crop.

Freedom from weeds is essential and fortunately not difficult to attain in a late summer seeding where a period of six weeks or more of seedbed preparation with successive harrowing has preceded seeding.

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A firm seedbed can hardly be obtained with a hastily prepared soil just prior to planting. Although the surface should be fine and loose to provide shallow covering of the seed, it is folly to sow alfalfa on a deep, loose seedbed.

Clean, viable adapted seed is essential. The presence of hard seed is an asset as it provides a continuous source of new plants to thicken the stand. Reference is here made to Research Bulletin No. 239, September, 1938, Iowa Agricultural Experiment Station entitled, "Laboratory Tests of Field Crop Seeds as Indicators of Seeding Value." The authors found, among other things, that samples of seed with a high percentage of hard seeds when sown at the same rate as, and in comparison with, samples containing few or no impermeable seeds gave a significantly higher field stand.

Inoculation is necessary if alfalfa is to gather nitrogen from the air. It usually requires a number of years to accumulate, under favorable soil conditions, an abundance of bacteria in the soil for maximum nodule production. This may be accomplished by selecting land for a new alfalfa seeding which had previously grown alfalfa or sweet clover. The application of a pure culture inoculant at the time of seeding may not be sufficient to provide adequate inoculation for a new seeding. Soil acidity is very detrimental to nodule-forming bacteria. Consequently, if the soil has been allowed to become quite acid the chances are that there will be poor inoculation in new seeding even though the new seedbed may be thoroughly limed and the new seed inoculated.

Early August seeding is recommended in order to provide ample time in the fall for the young plants to develop sufficient root reserves to withstand the first winter. Later plantings are hazardous.

Cultipack or roll the field after seeding in order to firm the soil around the seed and increase capillary action to provide moisture for germination. The use of a cultipacker is preferable to rolling since the soil is not inclined to crust or bake after a rain.

Late summer and fall rains are indispensable although, as some famous person has said, no one does anything about it.

Sweet Potatoes Dried on the Farm

Condensed from The Progressive Farmer

L. M. Ware

Horticulturist, Alabama Experiment Station

WHAT would the South give to average 50 to 90 bushels of corn per acre? What if the same feed could be obtained through sweet potatoes by finding a simple practical method of storage. The Alabama Experiment Station has found it, and Prof. Ware here tells the amazing story.

The sweet potato is a crop old to the South. It has been grown in a half-hearted fashion on most Southern farms since early Colonial days. Yields have seldom been what they should. Year after year the crop has been "banked" and used for food. A small quantity has been marketed. Culls have been fed to livestock. Probably a third to a half of the crop has been lost through storage decay.

This whole picture promises to be changed by a simple, inexpensive method of drying the fresh potato. By this process living tissue becomes lifeless, the product does not decay or freeze, and weighs only one-third as much as originally. It may go on the pantry shelf in neat packages or bags just as cereals, flour, or meal, or it may be prepared in large quantities sacked and stored for stock feed. It has now become a concentrate comparable to corn, barley, rice, meal, or flour, and can be stored for long periods without loss of value or change in composition.

But why so much interest in an old crop just because a new way of handling it has been devised? The answer is simple. What the farmers of the South have needed but have not had was a practical, economical way to change green potatoes into a dried concentrate, which would permit their general use for livestock feeding.

Six years of experiments by the Alabama Experiment Station, at various points in the state, have shown that three to five times as much carbohydrate feed can be produced on an acre from sweet potatoes as from corn, oats, or other grains. Other experiments in Alabama and neighboring states have also shown that dried potatoes compare favorably with corn for certain classes of livestock.

Some progress has been made

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in recent years on artificial drying of potatoes, but equipment for even a small to medium-sized plant costs $20,000 to $25,000.

It's a Simple Method

Last fall the Alabama Experiment Station began to study the use of cheap surfaces and Nature to do the drying. Results have exceeded expectations. It appears not too optimistic to say that the problem of drying potatoes is "licked." Even without further refinement in the methods being studied, it has already been proved that potatoes can be dried on many different kinds of low-cost surfaces even on days with little sun and high humidity.

At 11:15 a.m. on Oct. 29, cossettes (strings) of potatoes were placed outside on black building paper spread on a grass surface. By 5:00 p.m., 5 hours and 45 minutes later, over 6 tons of water per acre surface had been lost; by 11:00 a.m. of the following morning, 9 tons, and by 5:00 p.m. 11.9 tons had been lost. The two days were cloudy; the temperature ranged from 54 degrees to 66 degrees F., the relative humidity from 64 to 90 per cent. Yet in 24 hours drying had been fast enough to produce 4.55 tons of dried potatoes per acre of drying surface, a quantity having a feed value equal to 160 bushels of corn. Building paper to cover one acre will cost about $175. Experiments now under way indicate that even under bad weather conditions the same paper might be used for about 20 lots of potatoes, making the cost of material for drying about $2 per ton. With favorable weather, probably 40 lots could be dried on the same paper.

Many Types of Drying

Many types of surface appear satisfactory. Tests have been made on composition roofing, building paper, brown kraft paper, tin roofing, and priming asphalt. Of the surfaces which appear most promising, an asphalt priming coat dries potatoes fast and at a very low cost. For about $80 to $100 enough material can be bought to cover one acre. To this must be added the cost of preparing and packing the site and applying the asphalt. On sandy soil, a total of probably not over $300 would be required. The life of this surface should be long. No objectionable odors have been noted, and stock has eaten without hesitation potato cossettes dried on asphalt.

For each two tons of water lost, one ton of dried product is produced. Green potatoes spread on an asphalt priming surface on Nov. 3 at the rate of one pound per square foot, showed a per-acre water loss in 24 hours of 11.92 tons. This would mean 5.96 tons of dried potatoes per acre surface per day; on a more favorable day another lot yielded 6.75 tons.

Necessary Equipment

Two questions naturally arise:

1. What equipment is needed to dry potatoes?

2. How would returns from potatoes compare with corn?

Let's take a farmer whose 5 acres of potatoes have produced 300 bushels per acre. A drying area of one-fifth acre should handle this tonnage. A beet-type of shredder modified to handle sweet potatoes (costing $50-$75) and 18 rolls of black building paper (500 square feet per roll at $2 per roll), would be the only special equipment needed. A 2- to 3-horsepower motor would be needed if power were not already available. The drying area could handle 107 bushels per day, which could be shredded in 2 to 3 hours. Spread out on black building paper at the rate of two-thirds pound per square foot, the material will dry in 24 hours on a clear day with fairly high temperature and fairly low humidity. The 107 bushels will yield at least a ton of dry product.

On a clear day with high temperature, low humidity, and some wind, the paper would dry one pound of green potatoes per square foot in 24 hours—a total of about 1.5 tons of dried potatoes per day.

Potatoes vs. Corn

The 1,500 bushels from the 5 acres should yield 14 to 15 tons of dried potatoes. Ten days of good drying weather or 14 days of fairly good drying weather would be enough. At $25 per ton this would be worth $350 and would have a feed value of 490 bushels of corn.

It would have taken 20 acres to make this much corn. If the 5 acres had been planted to corn and 25 bushels per acre produced, the crop would have been worth $93.75 at 75 cents a bushel. Of course, the labor required in the two crops would be quite different.

Substituting sweet potatoes for corn is essentially the substitution of a high-yielding crop having a high labor requirement per acre for a low-yielding crop having a low labor requirement. In normal times the South must have more of the former if our limited acres of good land are to provide adequate income for our large rural population.

Acre Plan for Community

A community drying area would have certain advantages. One shredding machine would serve many farmers. Eighty-eight rolls of building paper, enough to cover one acre, would cost $176; or one acre of asphalt priming coat would cost $200 to $300. On days highly favorable to drying, 6 or 8 tons of dried material could be produced, or on less favorable days, 4 to 5 tons per day. A community unit of this

size should dry from 400 to 800 bushels of potatoes per day.

This simplified type of drying on the farm or on a community basis has many advantages over large-scale artificial drying:

1. No expensive buildings and machinery are required;
2. No high-cost overhead for management, technical supervision, etc., is necessary;
3. No fuel is needed;
4. Growers can use their own labor;
5. There would be the choice of days for the work;
6. Isolated farmers or communities may provide facilities which would not otherwise be available;
7. Long hauls are eliminated.

New Drug for White Scours

Infectious diarrhea, or, as more commonly known, white scours, has long been the bane of dairy-cattle farmers. The condition may appear in a very virulent form soon after birth, and the death rate of affected calves has remained high despite all methods of treatment.

It is possible that one of the new "sulfa" drugs called sulfaguanidine may be the final answer to the white-scours problem as well as many other acute intestinal troubles of animals.

Down at Clemson College in South Carolina five cases of typical white scours "recovered miraculously as a result of the administration of several doses of sulfaguanidine in aqueous suspension," according to the A.V.M.A. Journal.

"The treatment was continued until the diarrhea definitely subsided, which was usually a short time after giving the third dose. However, in one case only a single dose was necessary, whereas in another four doses were required."

Other reports in current veterinary literature indicate that this new sulfa drug has merit in swine enteritis and in coccidiosis of fowls, dogs, and other animals. As yet sulfaguanidine is too expensive for widespread use, and the dosage should be carefully calculated by a veterinarian before it is given to any sick animal.

—*Successful Farming*

Fitting the Show Herd

Condensed from American Hampshire Herdsman

Prof. J. S. Coffey
Ohio State College

THE show season is creeping up. Purebred breeders are surveying their herds for winning prospects, and the germ which perennially produces fair fever is getting a firm foothold.

While much of the urge to show hogs arises from a natural spirit of competition and from the desire to mingle with others who have a common interest, the real incentive should be to use the fair as an advertising medium in the sale of surplus animals. What is the good of a champion boar when none of his progeny is available for others to own? Some may say that in becoming a champion such a boar presents to the public correctness in type, and, therefore, breeders are benefited in having their conception of type improved. This viewpoint is not entirely without merit. At the same time such a boar is only half a champion unless there is progeny to prove his ability as a sire. Of course this applies only to senior champions or to competing boars old enough to be proven sires.

Many exhibitors in planning the show herd want to show double entries in every class. The wisdom of fitting two entries in the aged boar, senior yearling boar and possibly the junior yearling boar classes is doubtful. In the aged herd class a boar of any one of these three classes can be made the head. Therefore, a double entry is not necessary to provide a herd header. The fitting of a big boar involves considerable expense and a definite hazard to the fertility of the animal is imposed through heavy fitting. Furthermore, only one boar can head a class, and the advertising value of a lower rating is questionable.

The problem is somewhat different in sow and pig classes. While the heavy fitting of an older sow may interfere with normal reproduction, her complete removal from the herd is nothing to compare in seriousness with the loss of a boar's services. As to the pig classes, it is imperative to fit a sizeable number because replacements in the show herd frequently must be made.

It would be fortunate if judges would agree to discriminate against extremely highly-fitted

Reprinted by permission from the American Hampshire Herdsman, June, 1942

boars of older classification. But this is not done and probably will not be. Admittedly a high finish adds to the attractiveness of an animal, but it does no good to its reproductive functions. It therefore seems reasonable to advise fitters to use a type of feed which will make a boar firm and finished, yet not make him gaudily fat. Exercise plays an important part in attaining these ends. The necessity for abundant exercise suggests another reason for not fitting too many big boars, particularly if the exercising is made an individual matter.

Limited corn, oat feeds, mill feeds, tankage, linseed oil meal and limited milk, all can be used to an advantage in fitting older boars. Grass, of course, helps to keep the bowels in order, but there is some difficulty in providing pasture, and upon full feed, not a great amount is eaten by a boar. This part of the ration might be provided by cutting a small amount of succulent green feed daily and offering it to the boars. The following ration and feeding suggested are suited to the fitting of older boars.

Ground Corn	**50 lbs.**
Rolled Oats	**20 lbs.**
Wheat Middlings	**20 lbs.**
Alfalfa Meal	**3 lbs.**
Tankage	**3 lbs.**
Linseed Oil Meal	**3 lbs.**
Minerals	**1 lb.**

Enough milk may be added to this grain mixture to make a stiff slop. If too much milk is used in fitting, it may make the boar difficult to carry in bloom when the show season starts, due to the difficulty of getting milk. In fact, it seems advisable to discontinue the use of milk entirely before the show season starts, by gradually reducing the milk in the ration and replacing it with water.

Some fitters for the sake of convenience fit big boars in the same lot. This may be done if the boars are tusked and placed together early in the season. They soon learn to live together peacefully, but the best job of fitting is done if the boar is isolated except for a small barrow pig for company and competition at the feed trough. Certainly older boars and young ones, too, should be kept completely removed from sows which come in heat regularly.

Young boars, especially those of the senior boars pig class, frequently are difficult to fit. These pigs are disposed to fret and rant. Sometimes it becomes necessary to completely isolate an especially good prospect to get desired results. Any kind of management that will get results with a very promising show prospect should not be looked upon as too much trouble.

The same feeds as those suggested for older boars may be used for young boars. However,

somewhat different proportions should be used. Junior pigs can and should be fed more milk than those of the senior class. The following grain ration is suitable for both senior and junior boar pigs and may be used for sow pigs of corresponding ages.

Ground Corn	40 lbs.
Rolled Oats	25 lbs.
Wheat Middlings	20 lbs.
Alfalfa Meal	4 lbs.
Tankage	5 lbs.
Linseed Oil Meal	4 lbs.
Minerals	2 lbs.

In mixing the foregoing feed, more milk should be used for junior pigs than for those of the senior class.

Sows are much easier to fit than boars. The first ration suggested is suitable for all sows from junior yearlings up, while the second ration is appropriate for younger sows. The ideal finish for sows is that which produces a plump appearance. Flabbiness in sows cannot be entirely eliminated by feeds or feeding, because frequently this character is a part of their inheritance.

1. See that show hogs get ample exercise. This stimulates the appetite, firms the flesh and keeps the feet and legs in good condition.

2. Watch the feet of show hogs carefully for any abnormalities in growth. Keep the feet trimmed regularly, rather than waiting until the first show is at hand.

3. Regulate feeding activities in accordance with weather conditions. Appetites are usually depressed in hot muggy weather, and there is the danger present of over feeding and stalling appetites completely.

4. Brush show hogs regularly. This tames the animals, makes them more tractable and does much to improve hair coats.

5. If hides become scurfy, make regular applications of warm lime-sulphur dip. Use 1 pound of lime-sulphur to 10 to 15 gallons of water.

6. If older hogs become constipated, increase the allowance of linseed oilmeal. This feed is also valuable in giving bloom and sheen to the hair coat.

7. Do not wait until the show is at hand to remove the tusks from boars. This should be done on a cool day before the boar becomes highly finished.

8. Watch pigs carefully that have access to a self feeder. Frequently the construction of the feeder is such that the pigs bang their front legs and become over at the knees.

9. The proper development of a junior pig involves a proper combination of growth and finish. Too much growth and too little finish makes a pig appear rangy. Too much finish and too little

growth produces a pudgy lardy appearance. Therefore, there must be a delicate manipulation of proteins and carbohydrates in the ration in order to get the desired combination. The proper percentage of protein in the ration for pigs is somewhere between 15 and 20%.

10. Do not hesitate to fit older sows that are bred. A good sow carrying a litter is even more attractive than an open sow, in the eyes of most judges.

Summer Care of Calves

DON'T turn your young calves out on pasture in the spring just to eliminate the bother of feeding them in the barn. That's the advice of R. H. Olmstead in charge of dairy extension work with the Pennsylvania State College. Most young calves can't eat enough grass to maintain normal growth and that's why so many stunted calves are seen in many pastures.

It has been proved definitely that a close relationship exists between the size of a cow and the amount of milk she is capable of producing. Stunting a cow when she is young reduces her size at maturity as well as the amount of milk she is able to produce. On a dollars-and-cents basis, the size of the milk or cream check is also reduced. In most cases, large cows are the best milk-producers.

Olmstead admits that exercise and sunlight are good for calves, but claims that they should not be permitted to shift for themselves on pasture until they are at least 12 months old. But you can pasture calves after they're eight months old if you provide additional feed to meet the requirements of their rapidly growing bodies.

Feeding grains is advisable. Equal parts of ground oats and ground corn are excellent. If the pasture becomes short and dry during the heat of the summer, a little bran and soybean oilmeal added to the corn and oats may prove helpful in promoting better growth in the calves. Also, calves on pasture often will do better if fed some hay. Early-cut, sun-cured, green hay is best. It contains more nutrients and vitamins so necessary for the best growth and development.

To make the calves comfortable by protecting them against heat and flies, Olmstead suggests a darkened shelter. Some Pennsylvania dairymen are able to keep their calves in a pasture near the barn. They bring in the calves during the heat of the day and give them extra feed in the barn to keep them in a growing, thrifty condition.—*L. H. Hartwig, Successful Farming.*

Irrigation Increases Yields

Condensed from Electricity on the Farm

THIS article is largely a record of some farm irrigation experiences in Virginia and Ohio during the past three years. It is significant this year particularly when our best efforts are being directed to increasing production, and when a good house garden is a matter of considerable importance. While these experiences deal with commercial production, the water will do equally well on the farm garden.

Irrigation is more than a stimulant for a crop, faint from lack of rainfall. Properly timed and applied, irrigation water increases yields and improves quality. Because it does, equipment for irrigation is still available. For the garden it may take only a hose and rotating sprinkler heads.

Two rules which it is important to observe in the irrigation of most crops are: (1) apply the water before the crop starts to suffer for water; and (2) when you irrigate, put on plenty of water to penetrate deeply into the soil. It is much easier to keep plants growing than it is to revive them after they have been injured or stunted by drought.

W. P. Buchanan, of Glade Spring, Va., started irrigating 5½ acres on an experimental basis in 1939. It was a dry summer for truck crops in Virginia. His outfit consisted of a 500 gallon per hour pump and four lawn type revolving sprinklers which were operated 24 hours per day. The pump was too small and was replaced with a larger one. Water was pumped from a creek.

Strawberry plants were irrigated on June 3, given a good soaking. They were irrigated only once. At the time of irrigating the largest fruits had reached the size of a grain of corn and appeared to have ceased developing. A careful record was kept of the yield. Mr. Buchanan says: "We sold 748 gallons for a gross of $314.16 and saved 30 gallons for home use — a total yield of 778 gallons from a measured 0.9 acre. One of three varieties yielded at the rate of 1254 gallons per acre; the other two only half as much. The first bloom of all varieties was killed by frost. One very striking thing we observed was that certain small areas at the corners of the patch which did not get water, but which was as good land as the balance of it, bore very little fruit. I think a conservative estimate is that without irrigation the crop would have been less than one-third what was harvested and of very inferior quality.

Reprinted by permission from Electricity on the Farm, New York City

"Our young strawberry plants irrigated in July, in spite of the unfavorable season, were superior to anything we had had before.

"The 1940 season was so favorable that irrigation was not resorted to. In 1941 there was such a serious dry spell that there was no crop of wild strawberries and most cultivated ones in this general section produced not more, some less, than a half crop, and these of an inferior quality. Our yield was doubled and the revenue more than doubled by irrigation. No irrigating was done until after the bloom dropped, when the soil was thoroughly soaked to a depth of about 12 inches, with no further irrigation. Earlier experiences indicated that irrigation after the fruit is well developed resulted in soft inferior berries. 822 gallons were harvested. 798 gallons were sold at $3.00 to $2.50 per crate; 24 gallons were used at home. Receipts from 1 acre $381.00.

"We irrigated 2.33 acres of fall snap beans yielding 176 bushels for which we received $188.50. 1.9 acres of this had been in irrigated cabbage earlier in the season. 0.43 acres had been in early snaps, not irrigated. The 1.9 piece yielded fully twice as much per acre as the 0.43 acre piece which had not been irrigated during the preceding crop.

"This is mentioned to emphasize the residual effect of irrigation. On that point it might be said that the portions of the truck patch which received irrigation while growing cultivated crops give a growth of rye for turning under, much superior to those portions which were not irrigated during the summer.

"In a small way irrigation has been very profitable to us. One important thing we have learned is to treat the growing of these small things as things of importance, for, properly handled they are important from a revenue standpoint. In 1941 the power cost for irrigation was $7.64, negligible when compared with a gross return of $1,086.66 from 3½ acres of land—for half a season, for we have fall crops coming on now."

Mr. Guy E. Studebaker, of New Carlisle, Ohio, started irrigating potatoes in 1939. In 1941 he irrigated 40 acres of Irish cobblers, Chippewas and Katahdins. His outfit consists of a 500 g.p.m. centrifugal pump drawing water from a large pond dug in the bed of Honey Creek. Water is lifted approximately 20 feet and supplied to rotating sprinklers at 45 pounds pressure. Light weight slip-joint pipe in 16-foot sections is used to convey the water. He has 1,550 feet of 6-inch main and 720 feet of 4-inch laterals. Sprinklers are spaced 48 feet apart and are left in one

setting for 2½ hours to apply a depth of one inch of water. The system irrigates 1½ acres at a time and keeps two men busy. Fields are sandy, but are well fertilized with stable manure, green manure crops and 1,000 pounds of high potash fertilizer per acre. Mr. Studebaker has found that irrigation increases the size, yield and quality of the crop. More than 85% of the crop graded U. S. No. 1 last year. The average yield was between 375 and 400 bushels per acre which, Mr. Studebaker says, was 100 bushels better than without irrigation. Irrigation also provides moisture on the foliage which makes it possible to dust instead of spray, a faster and less expensive method.

Forrest Auckerman, of New Carlisle, started irrigating potatoes in 1938, and in 1941 had 70 acres under irrigation. He uses a centrifugal pump, quick-connect light weight pipe and rotating sprinklers. Having no stream, he hired a power shovel to dig a round pond 75 feet in diameter in the bottom of an old gravel pit. Ground-water stands in this pond to a depth of 10 feet. Mr. Auckerman says that even if the natural rainfall is normal, his irrigated potatoes yield enough better than those which are not irrigated to justify the additional expense.

Ed. Fall & Sons have been irrigating their truck farm since 1933. Water is pumped from a 6-inch cased well 200 feet deep with a 5 h.p. motor driving a 50 g.p.m. reciprocating pump. An overhead pipe sprinkler system is provided for about 20 acres. Because of the limited water supply, only tomatoes, sweet corn and cabbage are irrigated. Irrigation continues from the middle of May into October. Night and early morning irrigation is preferred, but during dry spells water is applied night and day. Ten hours is required to put an inch depth of water on one acre. In a normal season, water is applied once in every ten days. The irrigated crops grade high and bring good prices. There has been practically no dry rot of tomatoes under irrigation. Irrigated cabbage averaged 8 heads to the basket and unirrigated cabbage, 11 heads.

At the Georgia Vocational and Trades School farm at Monroe, the comparative yields of unirrigated and irrigated sweet potatoes was 50 and 266 bushels per acre. The cost of irrigating was $8.86 per acre.

On the farm of S. E. Conner, near Dayton, Tennessee, 3 acres of irrigated ladino clover carried 3.6 cows per acre for a pasture season of 210 days compared with the usual requirements of 1 to 2 acres per cow for non-irrigated, improved pastures.

Store Eggs for Lean Months!

Condensed from Farm Science Reporter

George F. Stewart, A. D. Okerkirk, Belle Lowe

MANY farm people who have plenty of eggs in the spring find themselves with none to sell in the fall when the prices go up because of the scanty supply, and not even enough to eat.

Two years ago Farm Science Reporter suggested that those who have cold storage lockers might wish to try freezing some of their cheap spring eggs and storing them as "whites" and "yolks" or as mixed whole eggs to be used months later.

Since that time we have done additional work here at the Iowa Station in an endeavor to improve the process of preparing eggs for freezing and also with storing eggs in the shells in water glass and with shells coated with oil.

Tests show that you can store eggs for as long as 6 months, either frozen or in the shell, without hurting their nutritive value, even though they may not retain all of their fine fresh flavor. Most of us eat a good share of our eggs in cakes, cookies, custards, salad dressings and the like. These stored eggs are perfectly satisfactory for cooking.

And so even folks who have sufficient supplies of fresh eggs the year around may find it profitable to store some eggs during the spring when prices are lowest of the year. The cost of storing eggs is very small.

One of the things our tests in the last two years have shown is that eggs which are going to be frozen and stored in lockers *should not be too fresh!* We have found that if you let eggs remain in the shells at a temperature of 70 to 80° F. for 3 to 5 days before they are broken out and frozen, you will have less trouble with the thick, gummy yolk. It's when we have frozen the real fresh eggs that we have had trouble.

But only real fresh eggs—not over 8 hours old—can be satisfactorily stored in the shell. To store eggs in the shell, either dipping them in oil or storing them in water glass is satisfactory. Water glass, which can be bought at the drug store, is the cheaper and probably will prove more satisfactory for most people. Here are the general rules for storing in water glass:

Reprinted from the Farm Science Reporter, Ames, Iowa, April, 1942

1. Use clean fresh eggs that are *not over eight hours old.*

2. Place the eggs small end down in a crock or stone jar. You can build up several layers, but avoid too many because of the danger of the weight breaking those at the bottom. Now cover the eggs with a water glass solution made by diluting 1 part of commercial water glass with 9 parts of boiled water. Ten quarts of the solution will cover 15 doz. eggs.

3. Cover the water glass solution with a thin layer of white mineral oil to avoid evaporation of the water.

We have tested and found white mineral oil satisfactory for coating the shells.

These oils usually can be obtained from retail or wholesale druggists, or the local tankcar oil dealer.

The rules for treating eggs with oil are:

1. Use clean sound eggs that are *not over eight hours old.*

2. Dip them in oil at 70 to 90° F. (using wire baskets) for a few seconds.

3. Drain to remove the excess oil, then place the eggs, small end down, in regular egg cases or, better yet, in clean crocks.

4. After they are treated, the eggs should be kept in the coolest place available—not cooler than 32° F. nor over 65° F.

5. Avoid storing the eggs where there are strong odors, because the eggs may pick them up.

We have found in using oil that eggs properly treated and handled will keep in excellent condition for 3 months and in edible condition for 5 months. Those stored in water glass will be somewhat superior in keeping quality, but are so tightly sealed that the shells must be punctured before boiling, or they will crack.

Because of the interest in freezing and storing eggs in cold storage lockers, we are repeating here the procedure, with the improvements which we have worked out since 1940.

The rules now are:

1. Allow the eggs to remain in the shells at 70 to 80° F. for 3 to 5 days before breaking and separating the yolks and whites. We find that "aging" the eggs a bit helps to avoid the gummy yolk which one gets with real fresh eggs.

2. Separate the yolks from the whites, using the egg shell or an egg separator.

3. The whites need no treatment whatsoever and may be placed immediately into a container for storage.

4. The yolks should be placed in a deep bowl and mixed thoroughly (an egg beater may be used if care is taken not to whip in air).

5. Now mix with the yolk one of the following:

a. Salt—1 teaspoon to every 2 cups of yolk.
b. Corn sirup—2 tablespoons to every 2 cups of yolk.
c. Honey—2 tablespoons to 2 cups of yolk.

Whether you use salt, sirup or honey depends on how you plan to use the eggs. Most all recipes will work well with salted yolk. A few foods, such as scrambled eggs, cannot be made with sweetened yolk, but sweetened yolk works fine with baked goods or mayonnaise.

6. The yolks are now ready to package for the freezer. We have found the waxed cartons work best, but you can use glass jars or tin cans.

The glass, wax and tin offer good protection against drying out in the locker. If covers are not available for the tin cans, cover the eggs after they are frozen with a small amount of water which will protect the surface from drying. All containers should be filled not fuller than an inch of the top to allow for expansion.

Once the eggs are prepared and in the container they should be frozen promptly. The yolk is likely to sour rapidly when held above freezing. The whites do not spoil so easily. The eggs are first placed in the freezer and later transferred to the locker after they are frozen.

Egg yolks and whites may be taken home as you need them, thawing and keeping them in the refrigerator. If you are in a hurry, they may be thawed in warm water (120-125° F.). We find that it is not safe to keep thawed yolks more than 48 hours even though they are in the refrigerator because of the danger of souring. Thawed whites may be kept as long as a week in the refrigerator, before they are used without undergoing any serious change.

These thawed yolks and whites may be used just as you now use fresh eggs whites and yolks. For convenience, you may use the following figures for estimating the amount of yolk and white corresponding to one egg.

2 tablespoons of white equals the white of one egg.

1 tablespoon of yolk equals the yolk of one egg.

Some folks may want to mix the whole egg before freezing, and this works very well. Mix whole eggs the same as yolks—with salt, sirup or honey.

We have found that egg yolks and whites prepared in the manner suggested may be stored in lockers a full year without loss of quality if the locker temperature is not higher than 5° above zero.

The Care of Milking Machines

Condensed from American Milk Review

Prof. H. J. Brueckner
Cornell University

THE problem of keeping the milking machine in a satisfactory sanitary condition with the minimum amount of labor is one of the outstanding problems of the dairy farmer.

The dairy utensil that has not been subjected to heat or to a "sterilizing" solution after proper washing is one of the chief means by which fresh milk is contaminated with bacteria. Dirty milking machines have been the cause of more poor milk than any other piece of equipment.

The ability of well-informed and careful dairymen to produce clean milk with milking machines is shown by the fact that certified milk is being produced with them. Market milk of excellent quality also is being produced with machines operated under ordinary farm conditions. There is no short-cut, however, to cleanliness; clean milk cannot be obtained by using neglected machines. To attain this objective, machines must be thoroughly and regularly washed and "sterilized." The best way to keep a milker clean is never to let it get dirty. The dairy industry has become so disturbed over the improper cleansing of milking machines that drastic actions have been taken by health departments and by dairy-plant operators.

Milking machines are not difficult to clean and to keep clean if there are adequate facilities to wash and "sterilize" them. Two wash tubs on a bench or a two-compartment sink makes washing easier than attempting to do the job in a 12-quart pail on the floor. Adequate brushes for the specific make of machine are indispensable, but they need not be elaborate or expensive. Brushes do not seem to be so harsh on rubber as are metal cleaning devices. The method of washing milking machines as here described requires a stall-cock in the milk house.

The construction of milking machines is such that persistent care must be exercised in cleaning them. The following parts require careful attention: teat cups and inflations; claws; rubber tubing; sight-glasses; pails; pail lids; valves; moisture traps

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or similar parts in pail lids; and vacuum lines.

Washing and "Sterilizing" the Milker

A number of definite steps are to be followed in the routine cleaning of the milker.

1. Rinse the milker immediately.

The first and all-important rule is: *never let a milking machine get dirty*. Milk does not dirty the milker unless it is allowed to dry on. Rinse the milker with lukewarm or cold water *immediately* after the last cow is milked—not 15 or 20 minutes later or after breakfast. Warm water loosens more milk than does cold water.

Suck from 2 to 3 gallons of warm water through each unit, completely dousing the teat cups up and down and in and out of the water to get an air brushing as well as a water brushing. This removes most of the milk that is left in the machine. Brush, with the rinse water sucked through the unit, the inside of the pail, the pail lid, the petcock or valve, and the sight-glass if there is any, and then the outside of the pail. Throw the rinse water away. Follow this procedure for each unit.

2. Wash the milker thoroughly.

Following the warm water rinse, suck through the machine at least from 1½ to 2 gallons of hot water (130 to 140 deg. F.) to which has been added 1 ounce (about 1 heaping tablespoon) of a good dairy washing powder, containing at least 4 per cent of a wetting agent. If the milker pail or any other parts are aluminum, a non-alkaline washing powder that will not corrode the aluminum should be used.

It is unnecessary to raise and lower the teat cups during the washing operation. Use clean water for each one, as the water must remove the last trace of milk and milkfat from the machine. Empty the hot water into one compartment of the sink or one of the tubs. Wash all adhering dirt, milk, bedding, and the like from the outside of the tubes and the teat cups.

3. Rinse and "sterilize" the milker.

"Sterilization" is not effective unless the milking machine parts are first free from all milk and dirt. Old milk and dirt protect the bacteria during "sterilization." These bacteria cause the contamination at the next milking.

If the teat-cup assembly is to be "sterilized" on a solution rack with chlorine or lye, the assembly is now ready to be hung on the rack. If the assembly is to be "sterilized" by rinsing with chlorine or water at 180 deg. F., then the tea-cup assembly is laid aside until the remainder of the unit is washed.

Disassemble the pulsator, the moisture trap, the valves, the rubber gaskets, and the like from

the pail lid, and wash them with proper brushes in the sink or tub containing the wash water. Wash also the milker pail.

The second compartment or tub should contain the chlorine "sterilizing" solution or cold unchlorinated rinse water. After washing the pail and the lid with its various parts, "sterilize" or rinse them in the second tub or compartment. If the milker pail and its parts were rinsed in the cold water only, the lid and its parts may be put into a stripping pail and covered with water at 180 deg. F. or above.

If the teat-cup assembly has been put on a solution rack, scald the milker pail with 180 deg. F. water. If the teat-cup assembly has not been put on the solution rack, assemble the machine and draw at least from 6 to 8 quarts of the chlorine or 180 deg. F. water through the teat-cup assembly and into the pail. Hang the teat-cup assembly so that it will drain and dry and not be exposed to an undue amount of dirt or dust. This is termed "dry storage" of teat-cup assemblies. The pail should be inverted on a rack and the lid hung so it will dry and remain clean.

Just before the next milking and after the machine is assembled, a pailful of chlorine solution should be sucked through each unit. This pail of chlorine can then be used to wash the cows' udders. The chlorine "sterilizing" solution, whether used in a solution rack or merely sucked through a machine for "sterilizing," should contain about 200 p.p.m. (parts of available chlorine per million parts of solution). The directions for diluting the commercial chlorine products usually are given on the container or leaflet attached to the container.

Dairymen who use hot water for "sterilizing" followed with dry storage seem well satisfied with results. Results in some sections of New York State seem so promising that quite a few municipal health departments are requesting that their producers use the 180 deg. "sterilizing" water and dry storage. A good supply of water at 180 deg. F. must be convenient. The rubber parts seem to last longer when dry storage is practiced than when stored from one milking to the next with the solution in the teat-cup assembly.

If a dairyman prefers to use a solution rather than dry storage, a solution rack rather than a crock is preferred. Usually a crock for "sterilizing" and storing the teat-cup assemblies is unsatisfactory. The advantages of the solution-rack method of "sterilization" over the crock method are:

(1) A new "sterilizing" solution is used each time, with no

doubt as to the strength of the solution; in the crock method the solution loses strength during use and on standing from one day to the next. The solution must be tested daily and changed at least once or twice a week. The teat cups, the claw, and the milk tube from a single unit of most milkers require from 1 pint to 1 quart of solution to fill them on a solution rack.

(2) With the rack method no air pockets form anywhere in the tubes for the solution is put into the milk tube or teat cups and drives the air out ahead of it. With the crock method, all air is not expelled from inside the teat cups and milk tube, air pockets may form in one tube or another and thus prevent the solution from coming in contact with all the inside surfaces.

The strength of solution recommended is about 200 p.p.m. All chlorine solutions should be stored in the dark or in brown-glass bottles or earthenware jugs. Many chlorine solutions kept in clear-glass bottles lose ¾ or more of their chlorine in 7 days. The above statement is made as a result of experiments conducted in a room in which the direct sunlight could not strike the bottles of chlorine.

Lye solutions for "sterilizing" teat-cup assemblies are used in many sections. A 0.5-per-cent lye solution is efficient and is as economical as the most economical chlorine "sterilizers." If the lye solution is made according to directions, one is more sure of its concentration after several days than of that of many chlorine solutions.

Lye is not harsh on rubber. The solution causes no pits or cracks in the rubber and no granular deposit on the rubber that may result from the use of some chlorine products. The rubber parts become too slippery to handle if the solution is much stronger than the one recommended.

Lye should not be used for "sterilizing" any milk utensils other than the teat-cup assembly.

The 0.5-per-cent lye solution may be made as follows:

Equipment—

1 One-gallon earthenware jug with rubber stopper, *not cork.*

1 One-gallon glass bottle with rubber stopper, *not cork.*

1 Enameled, glass, or china measuring cup.

Solution—

Put enough clear cold water into the earthenware jug to make it ¾ full. Add one 13-ounce can of ordinary household lye and let it dissolve. Completely fill the jug with clear cold water. Mix well. From the stock solution in the jug, take ¾ of a cup or ¾ of a half pint and put it into the gallon glass bottle or jug. Com-

pletely fill this bottle with clear cold water. Mix thoroughly. The 0.5-per-cent lye solution in the glass bottle or jug is ready to use for "sterilizing" the teat cups, claw, and milk hose of the milking machine.

To remove the dirty coating which frequently accumulates on the outside of the rubber tubes of a milker, submerge these parts into a 2-per-cent lye solution, heated to about 150 deg. F. for from 5 to 10 minutes. Rinse and wipe or brush clean.

To clean the vacuum lines, draw a 3- to 4-per-cent lye solution through them from the stall-cocks to the moisture trap just ahead of the pump in the vacuum line. Cleaning these lines at least twice a year is a good practice to acquire and is a precaution against possible contamination of the milk from this source. When flushing a pipe line, start at the stall-cock nearest the pump. Draw enough solution through this stall-cock to be sure that the line is clean to the moisture trap. Now skip one or two stall-cocks and suck more solution through the pipe line. Continue until the stall-cock farthest from the pump has been used. This procedure prevents the line from clogging if it is fairly dirty.

If a milker pail containing milk and the vacuum being drawn on it upsets, milk usually gets into the vacuum line. Draw cold water through the pipe line from the stall-cock through which the milk entered or a stall-cock nearer the end of the line immediately after the milking. This saves possible trouble in the next day or two.

Often the question is asked as to how often the teat-cup assembly should be taken apart to be cleaned. The recommendations of most milking-machine manufacturers and of many health authorities is to take the entire machine apart after each milking. It is doubtful whether this is necessary on every dairy farm in order to produce low-bacterial-count milk. Much depends upon the care given the machine, for persons vary in the thoroughness with which they wash a milker.

A good general rule to follow, however, after a milking machine is absolutely clean is to use it and wash it as suggested for two days, then take the teat-cup assembly apart for inspection. If *all* parts are clean, use the machine another day and re-inspect. It may be necessary to take the teat-cup assembly apart completely only once or twice a week. Careful operators produce low-count milk by adhering *strictly* to the suggested method of caring for their machines after *each milking*, and by taking their machines apart completely once a week to examine the rubber parts and to brush all other parts.

It is economical to have two

sets of inflations for each machine. Use one set for a week and then allow it to "rest" a week. The inflations when not in use should be placed in a dark, cool place, such as a cellar. Manufacturers state that two inflations handled in this way last as long as three sets when each is used constantly until worn out.

Clean rubber lasts much longer than dirty rubber. Milkfat is hard on any rubber, regardless of how good the rubber may be. Rinsing of the machine with plenty of warm water immediately after the last cow is milked and using a washing powder satisfactory for a particular water and containing a wetting agent will help to keep it clean with a minimum amount of labor and expense.

The short-tube machines that are suspended under a cow during milking may be taken apart easily and washed after each milking. Rinse and brush all the milk from the milker before using the washing-powder water to prevent the deposit of milkstone.

Inspect the stanchion hoses regularly and clean them when necessary. Stanchion hoses on short-tube machines need more attention than do those used with the platform or on long-tube machines. Some of the stanchion hoses on the short-tube machines must be cleaned at least weekly.

Clean all moisture traps on pail lids either by washing or wiping them with a clean, dry cloth if putting them in water causes trouble. Do this each time the machine is washed. A dirty moisture trap increases the bacterial count of milk even though theoretically it should not.

Any part of the milker that is neglected will sooner or later cause trouble not only for the dairymen but for everybody who has anything to do with the milk. It pays to produce clean and low-bacterial-count milk.

Breeding for Winter Milk

Condensed from The Goat World

Mrs. Carl Sandburg

MOST goat keepers are faced with the problem of lowered milk yield during the winter months. Occasionally we hear of herds with does freshening almost every month of the year, thereby equalizing the milk supply. These herds seem especially favored by climate or favorable location. But they are the exceptions. A considerable number of breeders have used artificial means for stimulating breeding activity out of the usual breeding season. It may be of interest to report our success with gonad-stimulating injections for summer breeding.

Dr. Charles W. Turner, of the Dairy Husbandry Department of the University of Missouri College of Agriculture, has long advised goat breeders to try the experiment of artificially inducing breeding activity by the injection of pregnant mare's serum.

In our herd we usually feel the under supply of milk during December and January. Accordingly on July 5th, eleven of our Toggenburg does and one Toggenburg buck were injected with 10 units each of Gonadogen (made by Upjohn Co., Kalamazoo, Michigan). Five of the eleven treated does came in heat within twelve days after the injection, and were bred. Three of these does were bred the third day after the treatment; the other two does about the twelfth day after treatment.

On July 24th, nineteen days after the first injection, we followed up with a second injection of the six does that had not responded with the first treatment. This time we used a veterinary preparation called Gonadin, and manufactured by the Cutter Laboratories (main office, Davis, California; branch office,Chicago, Illinois). For the second injection the dosage was 5cc. for each doe and 10cc. for each buck. Four of the six does came in heat within fourteen days.

I might add that there were twenty-one untreated Toggenburg does at the time of this experiment and not one of them came in season during this period. Our experiment certainly proves that gonad-stimulating hormones can be used to induce breeding activity in goats. It may be of interest that one of the does that responded to the first injec-

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tion has always been a problem breeder, and has skipped several years, as reported to me by her former owner. We found her a problem in our herd, as she gave but slight signs of being in season. However, on this occasion, she gave every sign, switching her tail violently and blatting loudly. It is possible therefore that these injections might be helpful not only for breeding goats out of season, but in general for breeding some types of "slow breeders."

The veterinary preparation is inexpensive, the material costing about 50c per doe for one dose, certainly a moderate price to pay for securing an ample supply of milk during the winter months. Injections are made into the muscle of the shoulder, or any muscle where there is good circulation and activity. The injection should not be made directly into the veins.

We are planning a more extensive experiment next year, and we plan to use only normal breeders, both in the group in the experiment, and in a control group of like number not treated. We expect to begin our experiment early in June for November fresheners, as this period is more definitely out of season, and so the results will be more conclusive. However, we are well pleased with our preliminary experiment this year, and our only regret is that we allowed so many years to pass without trying for better control of the spread of our milk supply.

Care of the Brood Mare

Condensed from The Horse

BREEDERS should realize that the production of horses is a partnership arrangement between the mare and the stallion, and that the type, quality, substance, and health of the foal depends jointly on the qualities of the stallion and the mare. Horses of the proper type, substance, and quality cannot be produced by mares and stallions of poor type, nor can good foals be produced from stallions and mares that are not in good condition and good health.

The mare is more than 50 per cent of the foal, and although the stallion is responsible for one-half the inherited characteristics, the mare must furnish sustenance for the foetus and nurse the foal; therefore, she is responsible for its development until weaned. It is appreciated that most breeders are forced to breed the mares they have, but in order to make horse production profitable, every stockman should eliminate bad mares and replace them as far as possible each year with better young mares.

Too many breeders assume that the stallion can do it all by himself, and are disappointed when they fail to get good foals by an excellent stallion out of poor mares.

The greatest care must be exercised in selecting brood mares and the following points should be given serious consideration.

Disposition is most important. Select kindly tempered mares, the kind which go about their work willingly and without excitement. Do not breed unbroken mares. Until a mare has been used, her temperament is unknown. Many horses are perfectly gentle until they are required to do hard or fast work. Breed mares which do willingly and quietly everything required of them. Few can afford the luxury of idle brood mares; therefore, mares that can be used in the daily work of the farm or ranch are most desirable.

Select mares which are attractive to the eye; with excellent heads; smooth, clean, well-placed, and straight legs; and which move well at all gaits.

Select rugged mares which always appear thrifty under all conditions and carry a large belly, well let down in front of

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***From the pamphlet, "Operation of The Remount Breeding Service," War Dept. Technical Manual,* 10-390**

their stifles at all times. In other words, a strong, healthy, roomy mare.

Select mares which are large, but not of great height with slender bodies. The latter type is leggy with little substance. Rather, take mares with large girth, well-sprung, well let down ribs, and plenty of bone below the knee and hock.

Select mares which are good milkers and do not neglect their foals; mares that are good mothers. When a mare has proved herself to be a bad mother, she should be discarded.

Select sound mares; mares free from transmissible defects. This is just as important in the selection of a brood mare as it is in the selection of a stallion.

Mares of known ancestry are desirable. The more purebred horses known to be in a mare's pedigree, the less chance of a throw-back to a plug. For this reason, registered mares are especially to be desired. Every breeder should look forward to having all mares in his brood mare band registered. Only in this way does one know what he is doing.

Save your best fillies for brood mares. Dealers and buyers who consider the future welfare of the horse industry should see that the best mares are left in the country as brood mares.

Breeders should keep an accurate record of all brood mares. Such a record should include everything known of the mare's history and breeding; also her breeding record and what is known of her produce. Only through such records can proper matings be made.

Brood mares can be kept in the best breeding condition by a well-balanced system of feeding and exercise. The ideal conditions are those of mares in pasture. A large proportion of horses, however, are produced by farmers who work their brood mares. There is no objection to this if they are not worked too hard and are given careful attention. In fact, it is preferable to work the mares rather than to allow them to stand idle in stables where they get too little exercise.

Brood mares, as well as all other livestock, should have access to a plentiful supply of hay or some good pasture, or both. Good alfalfa or good clover hay will assist in putting mares into good breeding condition. It is especially important that brood mares have access to a mixture of bonemeal and granulated salt. Phosphorus, which is present in bonemeal, is considered especially desirable for brood mares.

If the mares are not gentle and halter-broken, every effort should be made to gentle and halter-break them prior to the time they are to be bred. It is very difficult

properly to breed mares that are wild. Furthermore, when a wild mare foals, great difficulty will be experienced in gentling the foal. It does not pay to permit any breeding stock to be wild.

Brood mares should be in good, healthy flesh, but not rolling in fat, at the time of breeding. If the breeding season is such that green pastures are available, brood mares should have access to them as long as possible before they are bred. If mares are to be bred before pastures are green, they should be given ample feeding of alfalfa or leguminous hay of the best quality available.

Although some farmers and ranchers will not find it practicable, it is advisable to feed brood mares at least one feed of grain per day according to the amount of work they perform. If brood mares are idle, they should receive approximately 4 pounds of grain per day. If they are worked, they should receive from 6 to 10 pounds per day, depending upon the amount of work.

The grain mixture should be—

From October 15 to April 15—
- 40 to 50 per cent rolled oats.
- 20 to 30 per cent cracked corn or ground barley.
- 20 per cent bran.
- 10 per cent linseed meal or cottonseed meal.

From April 15 to October 15—
- 75 per cent rolled oats.
- 20 per cent bran.
- 5 per cent linseed meal or cottonseed meal.

It will be noted that the cracked corn or barley heat producing feeds, are omitted during the warmer months.

The condition of brood mares while carrying foals is of extreme importance. The 6 months before a foal is dropped is as important from the standpoint of his development as any 6 months of his life. During this time, the mare is responsible for furnishing everything necessary for his development and growth; therefore, she must receive the best of care and be in the best of health, or else the foal will suffer.

Care of Feet

Except in most unusual cases, brood mares which run in pasture the year round should not be shod. Their feet, however, should be inspected at regular intervals, trimmed, and leveled to keep them in good condition.

The Angora Rabbit

Condensed from New England Homestead

Allan T. Gilbert

THE angora rabbit is generally conceded to have originated early in 17th century, in Ankara, Turkey (formerly known as Angora). Natives were seen wearing beautiful shawls of a texture and appearance never seen before by sailors stopping at this port. Upon learning that this material was made from wool clipped from little white dog-like creatures, they purchased some of the animals and upon their return to France, took them along. The sailors did not own them long,—they were such timid, fairy-like creatures that after displaying them to the populace, they were soon purchased. It is from this beginning that the angora industry is claimed to have first seen its light of day—an industry which has the promise of being one of the largest branches of small animal husbandry in the country.

To France goes the credit of showing the world the commercial possibilities of this animal. They started the manufacture of this softest and warmest of wools into yarns, and the industry reached such proportions that before the war France was the largest exporter of this material in the world, and United States import records show that we imported 70,000 to 100,000 pounds of the raw wool alone, yearly. This does not include the yarns, and finished articles in which angora is used in blends to impart that softness of feel, lightness of weight, also warmth, which is so desired in articles of high quality.

But France was not the only country to see the possibilities of this "par excellent" fibre—England a short time later imported some of the animals and built up a trade before the war that almost rivalled that of France. From there it quickly spread to Germany and Japan—and Japan exported to this country last year, over 60,000 pounds. Not until 30 or 40 years ago, were there any angoras imported into this country, and then only as a curiosity —the commercial possibilities were not even thought of until eight or ten years ago.

We of the United States talk of our industrial superiority over other countries—yet we were not awake to the potentiality of the angora as a source of income, either as a supplement to other small animal raising, or as a full-time occupation. We seemed content to import what we needed.

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The fibre from the angora rabbit is known as the "Aristocrat of Wools" because it is seven times warmer than sheep wool in proportion to its weight, will not irritate the skin as will the coarser fibre of the sheep, and does not shrink with washing. It can also be blended very well with other raw fibres, such as silk, wool and synthetics.

The wool is clipped about four times a year, and is graded into five grades at time of shearing. No. 1 wool, which is 2½ inches or longer, absolutely free and clean, today brings the breeder $5.00 per pound. As soiled or stained wool brings only about 40 cents per pound, it devolves upon the breeder to keep his rabbits in a very sanitary condition, but this is done by keeping them in self-cleaning hutches, with floors of hardware cloth.

The principal feed for angoras is mixtures of oats, barley, wheat, soybean meal, etc., together with alfalfa, clover, timothy, etc.When available, lawn clippings, swiss chard, etc., may be fed, and in the winter, carrots, kohl-rabi and other vegetables.

Shearing is a simple procedure. First you brush well with a wire bristled brush, and then clip with a pair of good barber scissors. Breeders with large herds use electric clippers. The wool is graded at time of clipping, and is sold as it comes from the animal. The wool does not deteriorate, and if kept free from moisture and moths, can be stored indefinitely.

Besides the income from the wool many breeders add substantial revenue from the sale of the manure, which is dried in the sun and ground with an old grinder, bagged and sold to florists, seedhouses, and individuals for lawns and flowers. There is also the meat, and because of its close confinement, the meat of the angora is extremely tender. It is light colored, all over the animal, as the breast of the chicken. The nutritive value of rabbit meat rated by the government compared with other meats is as follows: Chicken 50 percent, pork 65 percent; beef 75 percent and rabbit 83 percent. Rabbit is just as good in summer as in winter, and domestic rabbit has never been known to have tularemia.

With proper care and management, a good income can be made by those who go into the raising of angoras on a commercial basis. For those who like to handle and breed small animals, but who haven't the time or money to devote to it on a large scale, the angora makes a very fine animal for a hobby, or as a sideline, as you can have a complete industry in your own home if you so desire—from the raising of your own wool to spinning the yarn

and making your own socks, gloves, sweaters, and clothes for the family. Angora wool is spun into yarn just as it comes from the animal. It does not need to be carded, as with sheep wool. An old fashioned flax wheel is used, such as is found in the attic of many a New England homestead.

Why Do Cattle Bloat?

Condensed from The Farmer

DOES sweet clover generate more gas in a cow or a sheep than blue grass? Do the blossoms of sweet clover or alfalfa cause cattle and sheep to bloat?

Scientists have attempted to answer these and many other questions about bloat of cattle and sheep, but thus far they have met with singular lack of success in their efforts to discover infallible preventive methods.

Farmers and scientists who have studied and observed bloat have found that preventive measures which work in one locality do not work in another. Indeed, bloat may occur in a herd on one side of a fence, and not on the other, although both herds may be grazing on exactly the same kind of legume in exactly the same stage of growth at exactly the same time of day. There is variation also in years.

For example, Prof. T. M. Olson, chief of the dairy department of South Dakota State College, reported in an article appearing in the Journal of Dairy Science that "for several years no bloat was experienced with cows on experimental legume pastures at the college. The cows were fed grain and not allowed to go on the pasture when hungry. The practice proved effective as a preventive measure against bloat for several years, but in later years cows bloated on both alfalfa and sweet clover, although the management of the cows had not been changed."

In the hope that amounts of gas generated by various kinds of legumes might offer a clue to solution of the bloat problem, Dr. Dwight Espy, of Iowa State College, took samples of various grasses and legumes, mixed them with the contents of the rumen (first stomach or paunch of a cow) and then incubated the

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samples at body temperature. Surprisingly it was not a legume that gave off most gas, but rather it was one of the grasses!

Could it be the kind of gas generated by some legumes which causes a higher bloat mortality than from non-legumes—poisonous gases perhaps? Prof. T. M. Olson sought to answer this question and got very interesting results. Inserting a stomach tube into the gullet of cows bloated from sweet clover and alfalfa, he got samples of the gases and analyzed them. There was no significant difference in kinds of gases from the two legumes. Then by laboratory methods he generated gases from samples of legumes and non-legumes and discovered no significant difference between the kinds of gases each produced.

In all of the samples Prof. Olson found a small percentage of carbon monoxide gas which is highly poisonous to both animals and humans. But carbon monoxide gas and another toxic gas, hydrogen sulphide, are produced under normal feeding conditions in non-legumes as well as legumes yet are not fatal to the animal, Prof. Olson points out. The other gases generated in the rumen are also present under normal feeding conditions, so he concludes as a possible explanation for death-dealing bloat that although these gases are present normally, they may be responsible for inducing conditions which make the toxic gases (carbon monoxide and hydrogen sulphide) fatal by increasing pressure or preventing the normal function of the cow's rumen.

One interesting theory advanced by an outstanding scientist is that at some stages of the growth of sweet clover and alfalfa they contain certain elements to which some cows are allergic just as some people are allergic to the pollen of ragweed, causing them to have hay fever. This theory may hold the answer to the cause of cattle bloat, but it leaves the question of how to prevent bloat far from being answered. It appears therefore that about the only rules to follow are the old ones which may or may not work, but which experience has taught at least cut down the number of bloat cases. These rules are:

1. Feed cattle and sheep before turning them on legume pasture.

2. Be particularly careful about pasturing young stock on legumes because they are seemingly more susceptible to whatever it is that causes bloat than older animals.

3. Bloat being most often observed when cattle are on the young growth of second year sweet clover, such sweet clover should not be pastured.

Commercial Lamb Feeding

Condensed from The Sheepman

D. S. Bell

Ohio Agriculture Experiment Station

THE fundamental object of lamb feeding is to market the surplus of farm grown grains and roughages by feeding them to lambs, and retain on the farm the crop residue in the form of manure, with which to maintain soil fertility. The carrying of this business undertaking to a successful financial conclusion is more difficult of attainment than the fundamental object. Financial success, aside from the buying and selling of the lambs, rests upon several factors, including (1) the feeder's ability, (2) physical equipment, (3) type of lamb, (4) character, quantity, and arrangement of the ration, (5) management of the lambs to avoid death loss, and (6) prompt marketing.

The feeder's ability is a factor of greater importance in lamb feeding than many would have us believe. It does not follow that only those with shepherding intuition, or those long trained in the school of experience, should engage in lamb feeding. But entirely upon the feeder rest such important items as detecting illness at its earliest appearance, observing promptly the first signs of going "off feed" and avoiding that catastrophe, noticing overcrowding, keeping the racks and troughs clean with the lambs eating full feed without waste, checking the response in gain and the improved condition for the amount of feed the lambs have consumed, and computing the financial position of the venture at any particular stage of the feeding period.

The physical equipment for lamb feeding need not be extensive nor expensive. A shed closed on three sides and covered with a roof that turns water is all that is necessary except in sections of the country where the winter weather is unusually severe. A lamb possessed of his wool coat is equipped to stand cold weather and often more harm than good is done by housing such lambs too closely. The basement of a bank barn is quite acceptable when good ventilation without draughts can be provided. If fleeces dampen without exposure to rain or snow, one should in-

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spect the ventilating system.

Floor space for fattening lambs need not exceed eight square feet per lamb, neither should it be much less than this. Ten linear inches of rack space or trough space is sufficient eating room for lambs up to 65 or 68 pounds weight. Above this weight, 12 inches per lamb is desirable.

Sunlight is a germ destroyer, so plenty of light is desirable in the lamb shed. In closed feeding sheds there should never be less than one square foot of glass for each 20 square feet of floor space, and more if it can be conveniently arranged. Under the open-shed system of housing the window glass area may be given less attention.

The type of lamb put into the feed lot influences the rate of gain. The appearance of black or black and white splotched faces on lambs from the range indicate a black-faced mutton sire, usually Hampshire or Suffolk. Such lambs have been our best gainers at the Ohio Experiment Station. Some white-faced lambs from the range also claim a Lincoln, Cotswold, Corriedale, or Columbia ram as their mutton sire. These are distinguishable from the white-faced finewool lambs by the longer staple and more open character of their wool. They too are excellent. White-faced finewool lambs are good feeders. The feeder should beware of the "sun-baked" and "bummer" lamb which is usually undersized and pot-bellied. These are slow to respond to feed, as are most lambs carrying excessive wrinkles. A high per cent of Merino blood makes a slower feeder but when sheared is usually a profitable feeder type. The big point in feeder selection is to get lambs that are thrifty, well framed but thin only because of a lack of finishing feed.

Native mutton lambs that have been produced under a good system of husbandry, but are thin because finishing feed was lacking, are just as good feeders as western lambs and can often be placed in the feed lot for a little less money. The treacherous native lamb is the one that is the product of gross neglect—a thin, parasitized, undernourished lamb. If one plans to feed native lambs, it is usually advantageous to see these lambs at home and incidentally know the husbandry practices under which they were raised.

Buck lambs make faster gains from the feed consumed than do ewe and wether lambs of similar breeding. Remember, however, that finished bucks are penalized by the packer buyer. They must be bought cheaper because of this penalty.

The ration of the lambs should be arranged from farm grown feeds insofar as possible. This is

usually economical and was the fundamental reason for the purchase of the lambs. Lamb feeders, however, should not hesitate to purchase one of the protein-rich concentrates with which to fortify the ration when such a procedure is indicated. When legume hay is not available, a protein concentrate is advisable. If the ration contains both shelled corn and other corn products, like silage or stover, a protein supplement is urged. Timothy hay as a roughage needs the fortification of a protein supplement. Incidentally, timothy cut for hay just as it comes into bloom is from 20 to 35 per cent more valuable for sheep than late-cut timothy. The average reduction in yield per acre has been about eight per cent in Ohio. If timothy is the roughage to be fed, cut it early, and fortify it with protein and calcium. When buying a protein supplement, select the one that furnishes a pound of protein at the lowest cost, not a pound of feed from the bag.

Of all the grains that are satisfactory for lamb feeding, corn is king. It may be ear corn, broken ear, shelled, or cracked corn. Considering corn as 100 per cent, the other grains hold about the following percentage relationship, on a pound for pound basis: Wheat, 87-95; oats, 70; rye, 90-95; barley, 85-90. Use the feed that costs the least per pound at the feed trough, using the above percentage. It is sometimes financially advantageous to sell one feed and buy another. A pencil and some paper on which to "figure" often makes a lamb feeder money.

Grinding grains and roughages for sheep or lambs is an added expense that returns very little on the investment.

The purchase of mineral supplements is usually a poor investment, especially when a leguminous roughage is fed. A healthy sheep or lamb does not need doctoring; an ailing one needs more specific attention than access to a box of mineralized condiments. If the ration is too carbonaceous, it is also likely calcium deficient, but one quarter-ounce of limestone flour per lamb is a corrective.

The arrangement of the ration is highly important. Start the lambs on feed with a stomach full of hay and only a sprinkle of grain. Finish the lambs on full grain allowance, but make sure that the roughage intake per lamb rarely falls below three-quarters pound per head daily. All changes in fattening lamb rations should be gradual. Be cautious, even to the extent of reducing at least slightly the grain allowance for full-fed lambs if a change in source of feed is necessary. Lambs after being on

feed one month will usually take with safety 1¼ pounds of concentrates. As they finish, 1½ to 1¾ and rarely two pounds of concentrates will be consumed. Three or four pounds of corn and two to three pounds of legume roughage will ordinarily convert into one pound of meat and wool. If one wishes to figure the number of lambs required for the amount of feed on hand—two bushels of corn and 200 pounds of hay will fatten a lamb: produce 30 pounds gain in 90 days on feed.

Hemorrhagic septicemia, and other diseases of an infectious nature, are often precipitated by some oversight in management. Keep the lambs protected from cold, drenching rains. When they first arrive, fill them up on mixed hay, or turn them into a pasture that is sparse of grass. The lambs are exceedingly hungry and likely have never seen a clover field. To turn newly arrived feeding lambs onto rich luxuriant pasture is to invite disaster.

Start the lambs on grain by using only a sprinkle until they get the taste. If the first allowance of grain is too liberal, there is nothing to prevent a few from eating what was intended for many. Digestive disturbances from this source are often fatal.

Lambs should be fed sparingly their first allowance of salt by sprinkling a little over the feed trough area. After a few days of this procedure and as soon as the lambs allow some salt to remain in the trough, free access to salt may be begun. Use at least two or three cafeteria-style salt boxes for each 100 lambs, and locate them in various parts of the feeding shed and lot. The lambs are sure to find them frequently and thus avoid suicide among the lambs from salt poisoning.

So-called "apoplexy" among feeding lambs often takes the biggest and fattest lambs after three, four, or more weeks on feed. It resembles hemorrhagic septicemia in lesions produced. It is distinguished from hemorrhagic septicemia in that hemorrhagic septicemia produces a high temperature and so-called "apoplexy" does not. Hemorrhagic septicemia usually occurs soon after the lambs arrive, while "apoplexy" never occurs until the lambs are on full feed.

The cause of "apoplexy" is not positively determined. Experiments indicate that it is an infectious entero-toxemia due to Bacillus Welchii, type D. It can be controlled by reducing the corn allowance among affected lambs. The use of 0.3 pound of molasses per lamb per day seems to have the property of inhibiting the development of "apoplexy."

To keep down to a minimum the chances for hand-fed lambs to go "off feed" allow only what-

ever grain they will consume promptly. If they linger longer than 20 to 25 minutes over a feed of palatable grain, reduce by one-fifth the amount to be given the next feed. Cut the allowance further if necessary. Increase again when the lambs are ready to take it.

There is one right time to sell a lamb and that is when he is fat. Finished lambs should be sold as soon as they are ready, because the feeder has only one chance to profit by keeping them longer. This rests on a rising market. All other factors are against the feeder, including a falling market, high feed costs, hazards of illness and possible death loss, and overweight lambs on which the market inflicts a penalty.

Using Blitzkrieg on Weeds

Condensed from Better Farms

THEY say "haste makes waste." But there's an exception to every rule, and the exception to this one promises to make weeding history.

George W. A. Graf, of Lockport, a Niagara county vegetable grower, had sweated all one blistering hot day at the back-breaking job of picking tiny weeds from flats of melon seedlings in his greenhouse.

His progress was slow, and by the time the shadows began to lengthen thousands of little weeds still remained. It was then that Mr. Graf gave 'way to a suppressed desire that had been seething in his brain all day. He got his blow torch.

After treating a couple boxes of melon plants, Mr. Graf was surprised to find that the majority of the plants remained unhurt by the quick application of flame, while the tiny weeds curled up and died.

Experimenting with the next few boxes, he found that by applying the blow torch with a light, rhythmic touch he could miss the melon plants and scorch only the weeds.

Best of all, he could "weed" an entire flat of plants with a few deft motions, whereas the manual task of pulling the weeds had taken him long, back-aching minutes.

He found he had weeded more flats in a few minutes with a blow torch than he had in the entire day.

This revolution in Mr. Graf's greenhouse weeding practices occurred nine years ago. He confesses he has kept his discovery a "trade secret," not because he didn't want to share it with other growers, but because he didn't

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want the responsibility of having them try to emulate him.

"It requires a very light touch," says Mr. Graf. "To hit the weeds and miss the plants, you have got to duck in and out, and if you let the flame from the torch linger on any one spot one infinitesimal fraction of a second too long, it's too bad."

Another New York state vegetable grower who goes in for torch weeding, though on a bigger and different scale, is W. A. Langdon, of Adirondack Gardens in Malone.

"We have used fire weeding on 50 acres of carrots for several years, and with very good results," says Mr. Langdon. "Many weeds will germinate about one day ahead of the carrots and be just above the ground while the carrots are still under the ground.

"Much more heat is required for fast operation than at first might be thought necessary, especially with grass seedlings, and this heat must be applied with force toward the ground. So long as this heat is not applied too long, there is no danger whatever to the carrots, even though they are only a paper thin distance underground.

"Seedling weeds, such as pig weeds, are destroyed entirely by such heat, so much so that no trace of them can be found in a few hours after the application. On the other hand, grass seedlings are much more resistant, and control may range from complete kill to mere delaying of growth by burning back to the leaves."

The fire weeder Mr. Langdon uses is made up of four burners or large blow torches using two and a half gallons of kerosene each per hour, or ten gallons per hour for the machine. The burners are mounted on a two-wheeled gig in such a way that they can be leveled for lighting or when traveling around the end of rows where the fire might ignite dry grass, and so they may be tilted downward at any desired angle toward the row.

One burner is used over each row. A sled of angle iron covered with sheet metal is trailed along behind with the flame without protection from the wind. A pick-up truck is used to pull the gig at a speed just a bit faster than a man can walk.

"I cannot at the moment give any accurate cost per acre," says Mr. Langdon. "It does cost, of course. If the crop is coming up in nearly clean soil, burning might not pay. The weedier the ground, the better the dividends from burning. It has, in fact, actually saved a few plantings of ours from being overcome by weeds before the carrots could be weeded, and thereby actually saved the crop for us.

"There is probably no one best way to use this method of weed control. My father, for instance, takes one of the burners on a wheelbarrow and covers one row of onions in a small patch.

"We hope in a year or two to set up a job covering twelve rows at once. Since we sow twelve rows at a time and can burn only four, and that, of course, at only a short period in germinating time, it is now necessary to divide into shifts and burn day and night until the field is covered. With car lights in front and the fire behind, this works out without difficulty."

Farming the Gum Forests

Condensed from The Nation's Agriculture

Eugene F. Greneker

Editor, American Turpentine Farmers Association Journal

IN the green slash and long leaf pine forests of the South, close to 300,000 men are engaged in one of the world's most ancient farming enterprises.

In this agricultural enterprise, nature has supplied the crop. Man applies his ingenuity and muscles to work it. These men are the gum-naval-stores farmers and their products are gum spirits of turpentine and rosin which come only from the living pine tree.

The early colonists used the pine tar and pitch to caulk the seams of their wooden vessels. The Phoenician mariners sailed in wooden ships likewise caulked. Thus, the term "Naval Stores" was applied to the industry. Today, however, gum turpentine and rosin have usurped the title, as both go into hundreds of commercial products and both have so many uses in their own right, other than regarding ships.

Pine trees are farmed. The forests are worked in crops, a crop being composed of 10,000 trees. Unlike the dirt farmer, the gum farmer doesn't have any spring plowing. He plows, however, but not to break the soil. He plows fire lines to protect his forests from the bugaboo of all timber—the woods fire. The gum farmer hasn't any seed to plant unless he wants to set out saplings to reclaim idle, once-cultivated acres or those eroded. Nature sees to most of his reseeding problems, but he must constantly protect them.

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The gum belt (or the gum producing pine trees) begins in North Carolina, and South Carolina, thence covers South Georgia, Florida, a portion of Alabama, Mississippi, Louisiana and a small part of bordering Texas.

Georgia is the largest producing state, Florida is next. Georgia produces 66⅔% of the country's annual production. The nation's gum crop has been valued as high as $60,000,000. Like all agriculture ventures, there have been lean seasons and healthy ones.

Approximately twenty years must elapse before a tree reaches ten inches in diameter at a point four and a half feet off the ground. This is the size recommended by the U. S. Forest Service, at which tapping operations should begin. Some of the more farsighted and progressive farmers wait for eleven inch diameters before tapping the trees.

With the first breath of spring, operations begin and they conclude generally with the first fall weather in October. The sap and gum circulate more freely in the warm season of the year.

On trees that are being worked, one fresh "streak" is put on each week for 32 weeks, starting at the bottom and working up the trunks. The workers use a sharp, short instrument known as a "hack" for scarifying the trees during the first three years of operation. For the next three years, he employs a longer instrument with a similar sharp cutting edge known as a "puller." These workers are so adept that it is a common occurrence for one man to "handle" 5,000 to 10,000 trees a week.

These wounds do not harm the trees. Nature has a remedy for healing. This process can be likened unto a nick on your finger. Naturally the blood runs, but will soon coagulate. Therefore, from the wound on the tree oozes a pale yellow, sticky substance which is known as oleoresin. A few hours after being exposed to the air it turns into a semi-liquid like white gum. It drips slowly but steadily and runs down the face of the tree trunk.

Cups that collect the oleoresin, or crude gum, are attached to the tree just beneath the streak or wound. In about a week, during warm weather, as they become filled, workers walk among the trees and empty the gum into buckets. These buckets are carried to the road and dumped into barrels. The full barrels are then hauled to the still where the gum is cooked in a sealed kettle that is attached to condensing coils. The turpentine, in vapor form, passes through coils that are surrounded with cold water, resulting in the turpentine vapor condensing into a clear liquid. The remaining residue that is

left from the distillation process is Gum Rosin. This substance, when cool, hardens into varying shades of hard, brittle, semi-transparent material.

On a commercial front, both commodities go into hundreds of products, and there are many uses. The most outstanding use for gum spirits is as a paint thinner. It penetrates the surface and anchors the paint. Rosin goes chiefly into soap, and paper.

When a tree has passed its period of usefulness for turpentine (each face can't exceed 90 inches in height), the gum farmer thins these trees out of his woods, for telephone poles, railroad cross ties, posts and lumber. Primarily though, gum farmers operate for turpentine, and this other business is entirely incidental.

It is a splendid conservation practice to thin out young trees, and most of these are sold to pulp mills which manufacture paper. Fire is an enemy of the gum producer, and he is constantly on guard against this menace. Tractors plough deep furrows through the woods as one method of preventing fires from spreading.

In line with the Department of Agriculture's step-up production to win the war, the gum farmer's quota for this year is 450,000 units, or about a 58% increase. A unit is 50 gallons of turpentine and 1348 pounds of rosin. A drum weighs 520 pounds net. At present, a unit brings $72.21, but the market is ever changing.

This increase in production will be hard to obtain, since the gum farmers, like their brothers of soil, face a serious labor shortage. Many of the leading producers believe they will be doing well if 325,000 units are produced.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Beef Cattle—By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Son, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Beekeeping—By Everett Franklin Phillips, Professor of Apiculture, Cornell University. Published by the Macmillan Co. $4.00.

Breeding Your Own, or Raising Colts for Pleasure and Profit—By Clarence E. Bosworth. The Derrydale Press ($10.00). A book suitable for the breeders of hunters' and saddle horses.

Conservation in the United States — By Gustafson, Ries, Guise and Hamilton. Comstock Publishing Co. (1940). $3.00.

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. Macmillan Company. $3.90.

Electricity in the Home and on the Farm, by Forrest B. Wright ($2.75). Published by John Wiley and Sons, Inc.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. Macmillan Co. $2.90.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00. J. B. Lippincott Co. $5.00.

Farm Records—By John A. Hopkins, Ph.D., Asso. Prof. of Eco., Iowa State Col.; pub. by Collegiate Press. $2.50.

Farm Management and Marketing—By V. B. Hart, Ext. Professor of Farm Management; M. C. Bond, Ext. Professor of Marketing; L. C. Cunningham, Ext. Asso. Professor of Farm Management; all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

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